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Smart Contract Audit Report

Security status

Safe

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Principal tester: knownsec blockchain security team

Release notes

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YFII v2 **Smart contract audit report**	V1.0	YFIIV2-ZNNY-20200924	**Open project Team**

The statement

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1. Review

The effective test time of this report is from September 22, 2020 to September 24, 2020. During this period, the security and standardization of the YFII v2 smart contract code will be audited and used as the statistical basis for the report. .

In this test, knownsec engineers conducted a comprehensive analysis of the common vulnerabilities of smart contracts (see Chapter 3), and the comprehensive evaluation was passed.

The smart contract security audit results: PASS

Since this test is conducted in a non-production environment, all codes are updated, the test process is communicated with the relevant interface personnel, and relevant test operations are carried out under the control of operational risks, so as to avoid production and operation risks and code security risks in the test process.

The target information of this test:

entry	description	
project name	YFII V2	
Contract address	Controller	0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f
	StrategyFortubeUSDT	0x1a6eC8EB73bf404112475895d6C8814ad5A7bd96
	iVaultUSDT	0x72Cf258c852Dc485a853370171d46B9D29fD3184
	StrategyCurveYCRVVoter	0x898828957133d4c50030a5A2D55Ca370915E6A77
	iVaultYCRV	0x3E3db9cc5b540d2794DB3861BE5A4887cF77E48B

	StrategyDForceDAI	0xbDD4a57c5EE8558370bb661d29a979657D81258e
	iVaultDAI	0x1e0DC67aEa5aA74718822590294230162B5f2064
	StrategyTUSDCurve	0x30aE128ebCdec11F62cB3fa9C6a0E8269a9AF686
	iVaultTUSD	0x4243f5C8683089b65a9F588B1AE578d5D84bFBC9
	StrategyFortubeUSDC	0x17D5C3FFe2A7c7a1E4567c7501d166B0532C8826
	iVaultUSDC	0x23B4dB3a435517fd5f2661a9c5a16f78311201c1
	StrategyFortubeETH	0x0c3E69eF29cbD32e0732409B748ef317a5F4f0a5
	iVaultETH	0xa8EA49a9e242fFfBdECc4583551c3BcB111456E6
	StrategyFortubeBUSD	0xB5639130ce84dE9684dA10B5E6d6Ec49828E0987
	iVaultBUSD	0xc46d2fC00554f1f874F37e6e3E828A0AdFEFfbcB
	StrategyFortubeHBTC	0xfe6A5A0efb399E2987bEe4d5DB89B925583d144b
	iVaultHBTC	0x26AEdD2205FF8a87AEF2eC9691d77Ce3f40CE6E9
Code type	Token code, DeFi protocol code, Ethereum smart contract code	

Code language	solidity

Contract Documents and Hash:

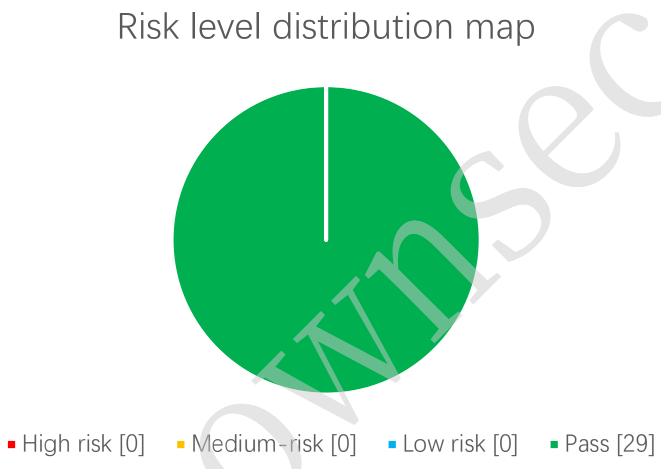
The contract documents	MD5
Controller.sol	e7123ac6b8307cd18b44feada0208b92
StrategyFortubeUSDT.sol	d3efeef6716466721df7d68d2ff7c6be
iVaultUSDT.sol	79966c7995a225db4b4214f7e46f732c
StrategyCurveYCRVVoter.sol	6ae2000311be6ad132fdad3ec772c286
iVaultYCRV.sol	c37b75d4917ac3f6fbedd9eb8ca21632
StrategyDForceDAI.sol	13278008b4e283c68672a5c886783d78
iVaultDAI.sol	c37b75d4917ac3f6fbedd9eb8ca21632
StrategyTUSDCurve.sol	0e727c2f694dd188759acc4044de1dfa
iVaultTUSD.sol	fa9889be789995c1bb04827685ea36f0
StrategyFortubeUSDC.sol	cf7f6f38119d83092a4dc63038b06cf3
iVaultUSDC.sol	fa9889be789995c1bb04827685ea36f0
StrategyFortubeETH.sol	6c0e3beaec6d68c3944dcbd95dafafe2
iVaultETH.sol	ec17ce67a7ab25d89aa2db37a92f31f1
StrategyFortubeBUSD.sol	cdd84bf2247a0699ec608f32a43eede8
iVaultBUSD.sol	c9004162c67c973ed9f868117b422db2
StrategyFortubeHBTC.sol	2e5d292556b938630b0d61f919075859
iVaultHBTC.sol	c9004162c67c973ed9f868117b422db2

2. Code vulnerability analysis

2.1. Vulnerability level distribution

This vulnerability risk is calculated by level:

Statistical table of vulnerability risk levels			
High Risk	Medium Risk	Low Risk	Pass
0	0	0	29



Summary of audit results

The audit results			
Test project	Test project	Test project	Test project
Smart contract Smart contract	Reentry attack detection	Pass	After testing, there is no such safety problem.
	Replay attack detection	Pass	After testing, there is no such safety problem.
	Rearrangement attack detection	Pass	After testing, there is no such safety problem.
	Numerical overflow detection	Pass	After testing, there is no such safety problem.
	Arithmetic accuracy error	Pass	After testing, there is no such safety problem.
	Access control defect detection	Pass	After testing, there is no such safety problem.
	tx.progin authentication	Pass	After testing, there is no such safety problem.
	call injection attack	Pass	After testing, there is no such safety problem.
	Return value call verification	Pass	After testing, there is no such safety problem.
	Uninitialized storage pointer	Pass	After testing, there is no such safety problem.
	Wrong use of random number detection	Pass	After testing, there is no such safety problem.

	Transaction order dependency detection	Pass	After testing, there is no such safety problem.
	Denial of service attack detection	Pass	After testing, there is no such safety problem.
	Logical design defect detection	Pass	After testing, there is no such safety problem.
	Fake recharge vulnerability detection	Pass	After testing, there is no such safety problem.
	Additional token issuance vulnerability detection	Pass	After testing, there is no such safety problem.
	Frozen account bypass detection	Pass	After testing, there is no such safety problem.
	Compiler version security	Pass	After testing, there is no such safety problem.
	Not recommended encoding	Pass	After testing, there is no such safety problem.
	Redundant code	Pass	After testing, there is no such safety problem.
	Use of safe arithmetic library	Pass	After testing, there is no such safety problem.
	Use of require/assert	Pass	After testing, there is no such safety problem.
	gas consumption	Pass	After testing, there is no such safety problem.

	Reentry attack detection	Pass	After testing, there is no such safety problem.
	Replay attack detection	Pass	After testing, there is no such safety problem.
	Rearrangement attack detection	Pass	After testing, there is no such safety problem.
	Numerical overflow detection	Pass	After testing, there is no such safety problem.
	Arithmetic accuracy error	Pass	After testing, there is no such safety problem.
	Access control defect detection	Pass	After testing, there is no such safety problem.

3. Code audit results analysis

3.1 Reentry attack detection [Pass]

Re-entry holes are The most famous ethereum smart contract holes that have led to The DAO hack of Ethereum.

The call.value() function in Soldesert consumes all the gas it receives when it is used to send Ether, and there is a risk of a reentrant attack if the operation to send Ether is called to the call.value() function before it actually reduces the balance in the sender's account.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.2 Replay attack detection [Pass]

If the requirement of delegation management is involved in the contract, attention should be paid to the non-reusability of verification to avoid replay attack

In the asset management system, there are often cases of entrusted management in which the principal gives the assets to the agent for management and the principal pays a certain fee to the agent. This business scenario is also common in smart contracts.

Detection results: After detection, the call function is not used in the smart contract, so there is no such vulnerability.

Safety advice: None.

3.3 Rearrangement attack detection [Pass]

A rearrangement attack is an attempt by a miner or other party to "compete" with an smart contract participant by inserting their information into a list or mapping, thereby giving the attacker an opportunity to store their information in the contract.

Detection results: After detection, there is no relevant vulnerability in the smart contract code.

Safety advice: None.

3.4 Numerical overflow detection [Pass]

The arithmetic problem in smart contract refers to integer overflow and integer underflow.

Instead of trying to contain something deep inside the body, which is capable of processing a maximum of 256 digits (2^256-1), a maximum increase of 1 would allow the body to drain down to zero.Similarly, when the number is unsigned, 0 minus 1 overflows to get the maximum number value.

Integer overflow and underflow are not a new type of vulnerability, but they are particularly dangerous in smart contracts. Overflow scenarios can lead to incorrect results, especially if the possibility is not anticipated, and can affect the reliability and security of the program.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.5 Arithmetic precision error [Pass]

Solidity as a programming language and common programming language similar data structure design, such as: variables, constants, and functions, arrays, functions, structure and so on, Solidity and common programming language also has a larger difference - no floating-point Solidity, Solidity and all the numerical computing results can only be an integer, decimal will not happen, also not allowed to define the decimal data type.The numerical calculation in the contract is essential, and the design of numerical calculation may cause relative error, such as the same-level calculation: 5/2*10=20, and 5*10/2=25, resulting in error, and the error will be larger and more obvious when the data is larger.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.6 Access control detection [Pass]

Reasonable permissions should be set for different functions in the contract

Check whether the functions in the contract have correctly used keywords such as public and private for visibility modification, and check whether the contract has correctly defined and used modifier to restrict access to key functions, so as to avoid problems caused by overstepping authority.

Detection result: After detection, there is no security problem in the smart contract code.

Security advice: None.

3.7 TX. Origin Authentication [Pass]

Tx. origin, a global variable that iterates over the entire call stack and returns the address of the account that originally sent the call (or transaction).Using this variable for authentication in a smart contract makes the contract vulnerable to phishing attacks.

Detection results: After detection, there is no security problem in the smart contract code.

The governance address of StrategyTUSDCurve.sol and StrategyCurveYCRVVoter.sol is tx.origin and msg.sender is used for other strategic contracts. Pay attention when deploying.

```
StrategyTUSDCurve.sol
constructor() public {
    governance = tx.origin;//knownsec// 治理地址为最初的调用者地址,部署时需注意
    controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
}
StrategyCurveYCRVVoter.sol
constructor() public {
    governance = tx.origin;//knownsec// 治理地址为最初的调用者地址,部署时需注意
    controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
    getName = string(
        abi.encodePacked("yfii:Strategy:",
            abi.encodePacked(IERC20(want).name(),
                abi.encodePacked(":",IERC20(output).name())
            )
        ));
    swap2YFIIRouting = [output,weth,yfii];//knownsec//   df <> weth <> yfii
    swap2TokenRouting = [output,weth,dai];//knownsec//   df <> weth <> DAI
    doApprove();
    strategyDev = tx.origin;
}
```

Safety advice: None.

3.8 Call injection attack [Pass]

When the call function is called, strict permission control should be done, or the dead call function should be written directly.

Detection results: After detection, the call function is not used in the smart contract, so there is no such vulnerability.

Safety advice: None.

3.9 Return value call validation [Pass]

This problem occurs mostly in smart contracts associated with currency transfers, so it is also known as silent failed or unchecked send.

A transfer method, such as transfer(), send(), or call.value(), could all be used to send Ether to an address, with the difference between throw and state rollback if the transfer fails;Only 2300GAS will be Pass for invocation to prevent reentrant attack;Send returns false on failure;Only 2300GAS will be Pass for invocation to prevent reentrant attack;Call.value returns false on failure;Passing all available gas for invocation (which can be restricted by Passing in the GAS_value parameter) does not effectively prevent a reentrant attack.

If the return value of the send and call.value transfer function above is not checked in the code, the contract will continue to execute the following code, possibly causing unexpected results due to the failure of Ether to send.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.10 Uninitialized storage pointer [Pass]

A special data structure is allowed to be struct in Soldesert, and local variables inside the function are stored in storage or memory by default.

Presence of storage and memory are two different concepts, which would involve trying to involve a pointer to an uninitialized reference, whereas an uninitialized local stroage would cause variables to point to other stored variables, leading to variable overwrite, or even more serious consequences, and struct variables should be avoided in development from initializing struct variables in functions.

Detection results: After detection, the smart contract code does not use the structure, there is no such problem.

Safety advice: None.

3.11 Error using random number [Pass]

In smart contracts may need to use a random number, although the Solidity of functions and variables can access the value of the unpredictable obviously such as block. The number and block. The timestamp, but they usually or more open than it looks, or is affected by the miners, that is, to some extent, these random Numbers is predictable, so a malicious user can copy it and usually rely on its unpredictability to attack the function.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.12 Transaction order dependence [Pass]

Since miners always get gas fees through a code that represents an externally owned address (EOA), users can specify higher fees for faster transactions.Because the Ethereum blockchain is public, everyone can see the content of other people's pending transactions. This means that if a user submits a valuable solution, a malicious user can steal the solution and copy its transaction at a higher cost to preempt the original solution.

Detection result: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.13 Denial of service attack [Pass]

In ethereum's world, denial of service is deadly, and smart contracts that suffer from this type of attack may never return to normal functioning. The reasons for smart contract denial of service can be many, including malicious behavior while on the receiving end of a transaction, gas depletion due to the artificial addition of needed gas for computing functions, abuse of access control to access private components of smart contracts, exploitation of obtuse and negligence, and so on.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.14 Logical design defects [Pass]

Check for business design-related security issues in the smart contract code.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.15 False recharge vulnerability [Pass]

In the transfer function of the token contract, the balance check over the originator (MSG. sender) becomes an if judgment method. When the veto [MSg. sender] < value, enter the else logic part and return false, no exception will become available. We believe that the if/else gentle judgment method is an unrigorous coding method in the transfer sensitive function scene.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.16 Issue of token loopholes [Pass]

Check whether there is a function that may increase the total amount of tokens in the token contract after initializing the total amount of tokens.

Detection result: After detection, there is no security problem in the smart contract code.

Security advice: None.

3.17 Freeze account to byPass [Pass]

Check whether the source account, the originating account and the target account are not checked when the token is transferred in the token contract.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.18 Compiler version security [Pass]

Check that a secure compiler version is used in the contract code implementation

Detection results: After detection, the compiler version of the smart contract

code is more than 0.5.8, there is no such security problem.

Safety advice: None.

3.19 Coding Method not recommended [Pass]

Check the contract code implementation to see if there are any officially recommended or deprecated encoding options

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.20 Redundant code [Pass]

Check if the contract code implementation contains redundant code

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.21 Use of secure arithmetic library [Pass]

Check if the SafeMath security arithmetic library is used in the contract code implementation

Detection results: The SafeMath security arithmetic library has been used in the smart contract code. There is no security problem.

Safety advice: None.

3.22 Use of require/ Assert [Pass]

Check the reasonableness of the use of require and Assert statements in your contractual code implementation

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.23 Gas consumption test [Pass]

Check whether the gas consumption exceeds the block maximum limit

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.24 Fallback function security [Pass]

Check that the Fallback function is used correctly in the contract code implementation

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.25 Owner permission control [Pass]

Check if the Owner in the contract code implementation has too many permissions.For example, arbitrarily modify other account balances, etc.

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.26 Low-level function security [Pass]

Check for security vulnerabilities caused by the use of the low-level functions called/Delegatecall used by the contract code implementation

The execution context of the call function is in the contract being invoked;The execution context of the Delegatecall function is in the contract where the function is currently called

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.27 Variable coverage [Pass]

Check the contract code implementation for security issues caused by variable overwriting

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.28 Timestamp dependency attack [Pass]

The timestamp of the data block usually USES the miner's local time, which can fluctuate in the range of about 900 seconds. When other nodes accept a new block, they only need to verify that the timestamp is later than the previous block and within 900 seconds of the local time.A miner can profit by setting the timestamp of the block to meet conditions as favorable to him as possible.

Check to see if there is any key functionality that depends on the timestamp in the contract code implementation

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

3.29 Use of unsafe interfaces [Pass]

Check whether unsafe interfaces are used in the contract code implementation

Detection results: After detection, there is no security problem in the smart contract code.

Safety advice: None.

4. Appendix A: Contract code

Source code for this test:

Controller.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-04
*/

/**
 *Submitted for verification at Etherscan.io on 2020-07-26
*/

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.15;//knownsec// 指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
	function totalSupply() external view returns (uint256);
	function balanceOf(address account) external view returns (uint256);
	function transfer(address recipient, uint256 amount) external returns (bool);
	function allowance(address owner, address spender) external view returns (uint256);
	function approve(address spender, uint256 amount) external returns (bool);
	function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
	event Transfer(address indexed from, address indexed to, uint256 value);
	event Approval(address indexed owner, address indexed spender, uint256 value);
}

library SafeMath {//knownsec// 安全算数库
	function add(uint256 a, uint256 b) internal pure returns (uint256) {
		uint256 c = a + b;
		require(c >= a, "SafeMath: addition overflow");

		return c;
	}
	function sub(uint256 a, uint256 b) internal pure returns (uint256) {
		return sub(a, b, "SafeMath: subtraction overflow");
	}
	function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
		require(b <= a, errorMessage);
		uint256 c = a - b;

		return c;
	}
	function mul(uint256 a, uint256 b) internal pure returns (uint256) {
		if (a == 0) {
			return 0;
		}

		uint256 c = a * b;
		require(c / a == b, "SafeMath: multiplication overflow");

		return c;
	}
	function div(uint256 a, uint256 b) internal pure returns (uint256) {
		return div(a, b, "SafeMath: division by zero");
	}
	function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
		// Solidity only automatically asserts when dividing by 0
		require(b > 0, errorMessage);
		uint256 c = a / b;

		return c;
	}
	function mod(uint256 a, uint256 b) internal pure returns (uint256) {
		return mod(a, b, "SafeMath: modulo by zero");
	}
	function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
		require(b != 0, errorMessage);
		return a % b;
	}
}

library Address {//knownsec// OpenZeppelin Address 库
	function isContract(address account) internal view returns (bool) {
		bytes32 codehash;
		bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
		// solhint-disable-next-line no-inline-assembly
		assembly { codehash := extcodehash(account) }
		return (codehash != 0x0 && codehash != accountHash);
	}
	function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}

interface Strategy {//knownsec//  策略池接口
    function want() external view returns (address);
    function deposit() external;
    function withdraw(address) external;
    function withdraw(uint) external;
    function withdrawAll() external returns (uint);
    function balanceOf() external view returns (uint);
}

interface Converter {
    function convert(address) external returns (uint);
}

interface OneSplitAudit {
    function swap(
        address fromToken,
        address destToken,
        uint256 amount,
        uint256 minReturn,
        uint256[] calldata distribution,
        uint256 flags
    )
        external
        payable
        returns(uint256 returnAmount);

    function getExpectedReturn(
        address fromToken,
        address destToken,
        uint256 amount,
        uint256 parts,
        uint256 flags // See constants in IOneSplit.sol
    )
        external
        view
        returns(
            uint256 returnAmount,
            uint256[] memory distribution
        );
}

contract Controller {
    using SafeERC20 for IERC20;
    using Address for address;
    using SafeMath for uint256;

    address public governance;
    address public onesplit;
    address public rewards;
    address public factory;
    mapping(address => address) public vaults;
    mapping(address => address) public strategies;
    mapping(address => mapping(address => address)) public converters;//knownsec//  转换器

    uint public split = 5000;
    uint public constant max = 10000;


    event NewVault(address indexed _token, address indexed _vault);


    constructor() public {
        governance = tx.origin;
        onesplit = address(0x50FDA034C0Ce7a8f7EFDAebDA7Aa7cA21CC1267e);
        rewards = 0x887F507EaAc58adD20263C6918538A9BdC882d47;
    }

    function setFactory(address _factory) public {//knownsec//  设置工厂合约,仅治理地址调用
        require(msg.sender == governance, "!governance");
        factory = _factory;
    }

    function setSplit(uint _split) public {//knownsec//  设置 split 值,仅治理地址调用
        require(msg.sender == governance, "!governance");
        split = _split;
    }

    function setOneSplit(address _onesplit) public {//knownsec//  设置 onesplit 地址,仅治理地址调用
        require(msg.sender == governance, "!governance");
        onesplit = _onesplit;
    }

    function setGovernance(address _governance) public {//knownsec//  设置治理地址,仅治理地址调用
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setVault(address _token, address _vault) public {//knownsec//  添加新代币及策略,仅治理地址调用
        //TODO:加个 Event  添加新的策略了.
        require(msg.sender == governance, "!governance");
        vaults[_token] = _vault;
        emit NewVault(_token, _vault);
    }

    function setConverter(address _input, address _output, address _converter) public {//knownsec//  设置转换器
地址,仅治理地址调用
        require(msg.sender == governance, "!governance");
        converters[_input][_output] = _converter;
    }

    function setStrategy(address _token, address _strategy) public {//knownsec//  添加新策略地址,仅治理地址调
用
        //某个币对应一个策略,比如现在的ycrv 就是挖 yfii
        require(msg.sender == governance, "!governance");
        address _current = strategies[_token];
        if (_current != address(0)) {//之前的策略存在的话,那么就先提取所有资金
            Strategy(_current).withdrawAll();
        }
        strategies[_token] = _strategy;
    }

    //
    function earn(address _token, uint _amount) public {
        address _strategy = strategies[_token]; //获取策略的合约地址
        address _want = Strategy(_strategy).want();//策略需要的token 地址
        if (_want != _token) {//如果策略需要的和输入的不一样,需要先转换
            address converter = converters[_token][_want];//转换器合约地址.
            IERC20(_token).safeTransfer(converter, _amount);//给转换器打钱
            _amount = Converter(converter).convert(_strategy);//执行转换...
            IERC20(_want).safeTransfer(_strategy, _amount);
        } else {
            IERC20(_token).safeTransfer(_strategy, _amount);
        }
        Strategy(_strategy).deposit();//存钱
    }

    function balanceOf(address _token) external view returns (uint) {
        return Strategy(strategies[_token]).balanceOf();
    }

    function withdrawAll(address _token) public {//knownsec//  提取指定代币所有余额,仅治理地址调用
```

```
        require(msg.sender == governance, "!governance");
        Strategy(strategies[_token]).withdrawAll();
    }

    function inCaseTokensGetStuck(address _token, uint _amount) public {//转任意 erc20
        require(msg.sender == governance, "!governance");
        IERC20(_token).safeTransfer(governance, _amount);//knownsec// 将指定代币转移至治理地址账户
    }

    function getExpectedReturn(address _strategy, address _token, uint parts) public view returns (uint expected)
{
        uint _balance = IERC20(_token).balanceOf(_strategy);//获取策略器 某个代币的余额
        address _want = Strategy(_strategy).want();//策略器需要的代币.
        (expected,) = OneSplitAudit(onesplit).getExpectedReturn(_token, _want, _balance, parts, 0);
    }

    // Only allows to withdraw non-core strategy tokens ~ this is over and above normal yield
    function yearn(address _strategy, address _token, uint parts) public {
        // This contract should never have value in it, but just incase since this is a public call
        uint _before = IERC20(_token).balanceOf(address(this));
        Strategy(_strategy).withdraw(_token);//knownsec// 将策略合约的所有 token 提取至本合约
        uint _after =  IERC20(_token).balanceOf(address(this));
        if (_after > _before) {
            uint _amount = _after.sub(_before);//knownsec// 提现的实际值
            address _want = Strategy(_strategy).want();
            uint[] memory _distribution;
            uint _expected;
            _before = IERC20(_want).balanceOf(address(this));//knownsec// 本合约的指定策略所需代币量
            IERC20(_token).safeApprove(onesplit, 0);
            IERC20(_token).safeApprove(onesplit, _amount);//knownsec// 授权 onesplit 差值额度
            (_expected, _distribution) = OneSplitAudit(onesplit).getExpectedReturn(_token, _want, _amount,
parts, 0);
            OneSplitAudit(onesplit).swap(_token, _want, _amount, _expected, _distribution, 0);//knownsec//
_token 转换为 _want
            _after = IERC20(_want).balanceOf(address(this));//knownsec// 转换后本合约的指定策略所需代
币量
            if (_after > _before) {
                _amount = _after.sub(_before);//knownsec// 转换前后实际差值
                uint _reward = _amount.mul(split).div(max);//knownsec// 奖励 = 实际差值 * split / max
                earn(_want, _amount.sub(_reward));//knownsec// 差值 - 奖励 用于策略投资
                IERC20(_want).safeTransfer(rewards, _reward);//knownsec// 奖励转给 rewards 地址
            }
        }
    }

    function withdraw(address _token, uint _amount) public {//knownsec// 提取指定代币一定额度,仅代币库地
址调用
        require(msg.sender == vaults[_token], "!vault");
        Strategy(strategies[_token]).withdraw(_amount);
    }
}
```

StrategyFortubeUSDT.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-13
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.17;//knownsec// 指定编译器版本

interface IERC20 {
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function decimals() external view returns (uint);
    function name() external view returns (string memory);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

library SafeMath {//knownsec// 安全算数库
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {//knownsec// OpenZeppelin Address 库
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
        }
}

interface Controller {//knownsec//  控制器接口
        function vaults(address) external view returns (address);
        function rewards() external view returns (address);
}

/*

  A strategy must implement the following calls;

  - deposit()
  - withdraw(address) must exclude any tokens used in the yield - Controller role - withdraw should return to
Controller
  - withdraw(uint) - Controller | Vault role - withdraw should always return to vault
  - withdrawAll() - Controller | Vault role - withdraw should always return to vault
  - balanceOf()

  Where possible, strategies must remain as immutable as possible, instead of updating variables, we update the
contract by linking it in the controller

*/



interface UniswapRouter {
        function swapExactTokensForTokens(uint, uint, address[] calldata, address, uint) external;
}
interface For{
        function deposit(address token, uint256 amount) external payable;
        function withdraw(address underlying, uint256 withdrawTokens) external;
        function withdrawUnderlying(address underlying, uint256 amount) external;
        function controller() view external returns(address);

}
interface IFToken {
        function balanceOf(address account) external view returns (uint256);

        function calcBalanceOfUnderlying(address owner)
                external
                view
                returns (uint256);
}

interface IBankController {

        function getFTokeAddress(address underlying)
                external
                view
                returns (address);
}
interface ForReward{
        function claimReward() external;
}

contract StrategyFortube {
        using SafeERC20 for IERC20;
        using Address for address;
        using SafeMath for uint256;

        address constant public want = address(0xdAC17F958D2ee523a2206206994597C13D831ec7); //usdc
//knownsec// USDT
        address constant public output = address(0x1FCdcE58959f536621d76f5b7FfB955baa5A672F); //for
        address constant public unirouter = address(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);
        address constant public weth = address(0xC02aaA39b223FE8D0A0e5C4F27eAD9083C756Cc2); // used for
for <> weth <> usdc route

        address constant public yfii = address(0xa1d0E215a23d7030842FC67cE582a6aFa3CCaB83);


        address constant public fortube = address(0xdE7B3b2Fe0E7b4925107615A5b199a4EB40D9ca9);//主合约.
        address constant public fortube_reward = address(0xF8Df2E6E46AC00Cdf3616C4E35278b7704289d82); //
领取奖励的合约


        uint public strategyfee = 100;//knownsec// 10% strategyfee/max
        uint public fee = 300;//knownsec// 30% fee/max
        uint public burnfee = 500;//knownsec// 50% burnfee/max
        uint public callfee = 100;//knownsec// 10% callfee/max
        uint constant public max = 1000;

        uint public withdrawalFee = 0;
        uint constant public withdrawalMax = 10000;

        address public governance;
        address public strategyDev;
address public controller;
address public burnAddress = 0xB6af2DabCEBC7d30E440714A33E5BD45CEEd103a;

string public getName;

address[] public swap2YFIIRouting;
address[] public swap2TokenRouting;


constructor() public {
        governance = msg.sender;//knownsec//  治理地址为合约部署者
        controller = 0xcDCf1f9Ac816Fed665B09a00f60c885dd8848b02;
        getName = string(
                abi.encodePacked("yfii:Strategy:",
                        abi.encodePacked(IERC20(want).name(),"The Force Token"
                        )
                ));
        swap2YFIIRouting = [output,weth,yfii];//knownsec// for <> weth <> yfii
        swap2TokenRouting = [output,weth,want];//knownsec// for <> weth <> USDT
        doApprove();
        strategyDev = tx.origin;
}

function doApprove () public{//knownsec//  授权 unirouter 额度
        IERC20(output).safeApprove(unirouter, 0);
        IERC20(output).safeApprove(unirouter, uint(-1));
}


function deposit() public {//knownsec//  流动性挖矿
        uint _want = IERC20(want).balanceOf(address(this));
        address _controller = For(fortube).controller();
        if (_want > 0) {
                IERC20(want).safeApprove(_controller, 0);
                IERC20(want).safeApprove(_controller, _want);
                For(fortube).deposit(want,_want);
        }

}

// Controller only function for creating additional rewards from dust
function withdraw(IERC20 _asset) external returns (uint balance) {//knownsec//  提现某资产 for/weth
        require(msg.sender == controller, "!controller");//knownsec// 仅控制器调用
        require(want != address(_asset), "want");//knownsec//  校验不为 USDT
        balance = _asset.balanceOf(address(this));
        _asset.safeTransfer(controller, balance);
}

// Withdraw partial funds, normally used with a vault withdrawal
function withdraw(uint _amount) external {
        require(msg.sender == controller, "!controller");
        uint _balance = IERC20(want).balanceOf(address(this));
        if (_balance < _amount) {
                _amount = _withdrawSome(_amount.sub(_balance));
                _amount = _amount.add(_balance);
        }

        uint _fee = 0;
        if (withdrawalFee>0){//knownsec//  若有提现费,收取 withdrawalFee/withdrawalMax
                _fee = _amount.mul(withdrawalFee).div(withdrawalMax);
                IERC20(want).safeTransfer(Controller(controller).rewards(), _fee);
        }


        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, _amount.sub(_fee));
}

// Withdraw all funds, normally used when migrating strategies
function withdrawAll() external returns (uint balance) {
        require(msg.sender == controller || msg.sender == governance,"!governance");
        _withdrawAll();


        balance = IERC20(want).balanceOf(address(this));

        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, balance);//knownsec//  本合约所有 USDT 转给对应 vault
}

function _withdrawAll() internal {
        address _controller = For(fortube).controller();
        IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(want));
        uint b = fToken.balanceOf(address(this));
        For(fortube).withdraw(want,b);
```

```
    }

    function harvest() public {
        require(!Address.isContract(msg.sender),"!contract");
        ForReward(fortube_reward).claimReward();
        doswap();
        dosplit();//分 yfii
        deposit();
    }

    function doswap() internal {
        uint256 _2token = IERC20(output).balanceOf(address(this)).mul(90).div(100); //90%
        uint256 _2yfii = IERC20(output).balanceOf(address(this)).mul(10).div(100);  //10%
        UniswapRouter(unirouter).swapExactTokensForTokens(_2token, 0, swap2TokenRouting, address(this),
now.add(1800));
        UniswapRouter(unirouter).swapExactTokensForTokens(_2yfii, 0, swap2YFIIRouting, address(this),
now.add(1800));
    }
    function dosplit() internal{//knownsec// 分发 yfii
        uint b = IERC20(yfii).balanceOf(address(this));
        uint _fee = b.mul(fee).div(max);//knownsec// 本合约 YFII 量 * fee / max
        uint _callfee = b.mul(callfee).div(max);//knownsec// 本合约 YFII 量 * callfee / max
        uint _burnfee = b.mul(burnfee).div(max);//knownsec// 本合约 YFII 量 * burnfee / max
        IERC20(yfii).safeTransfer(Controller(controller).rewards(), _fee); //3%  3% team
        IERC20(yfii).safeTransfer(msg.sender, _callfee); //call fee 1%
        IERC20(yfii).safeTransfer(burnAddress, _burnfee); //burn fee 5%

        if (strategyfee >0){
            uint _strategyfee = b.mul(strategyfee).div(max); //1%
            IERC20(yfii).safeTransfer(strategyDev, _strategyfee);
        }
    }

    function _withdrawSome(uint256 _amount) internal returns (uint) {
        For(fortube).withdrawUnderlying(want,_amount);
        return _amount;
    }

    function balanceOfWant() public view returns (uint) {
        return IERC20(want).balanceOf(address(this));
    }

    function balanceOfPool() public view returns (uint) {
        address _controller = For(fortube).controller();
        IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(want));
        return fToken.calcBalanceOfUnderlying(address(this));
    }


    function balanceOf() public view returns (uint) {
        return balanceOfWant()
               .add(balanceOfPool());
    }

    function setGovernance(address _governance) external {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) external {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        fee = _fee;
    }
    function setStrategyFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        strategyfee = _fee;
    }
    function setCallFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        callfee = _fee;
    }
    function setBurnFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        burnfee = _fee;
    }
    function setBurnAddress(address _burnAddress) public{
        require(msg.sender == governance, "!governance");
        burnAddress = _burnAddress;
    }

    function setWithdrawalFee(uint _withdrawalFee) external {
        require(msg.sender == governance, "!governance");
        require(_withdrawalFee <=100,"fee >= 1%"); //max:1%
```

```
            withdrawalFee = _withdrawalFee;
        }
}
```

iVaultUSDT.sol

```
/**
  *Submitted for verification at Etherscan.io on 2020-09-03
*/

/**
  *Submitted for verification at Etherscan.io on 2020-08-13
*/

pragma solidity ^0.5.16;//knownsec// 指定编译器版本

interface IERC20 {
        function totalSupply() external view returns (uint256);
        function balanceOf(address account) external view returns (uint256);
        function transfer(address recipient, uint256 amount) external returns (bool);
        function allowance(address owner, address spender) external view returns (uint256);
        function approve(address spender, uint256 amount) external returns (bool);
        function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
        event Transfer(address indexed from, address indexed to, uint256 value);
        event Approval(address indexed owner, address indexed spender, uint256 value);
}

contract Context {
        constructor () internal { }
        // solhint-disable-previous-line no-empty-blocks

        function _msgSender() internal view returns (address payable) {
                return msg.sender;
        }

        function _msgData() internal view returns (bytes memory) {
                this;    //    silence    state    mutability    warning    without    generating    bytecode    -    see
https://github.com/ethereum/solidity/issues/2691
                return msg.data;
        }
}

contract Ownable is Context {
        address private _owner;

        event OwnershipTransferred(address indexed previousOwner, address indexed newOwner);
        constructor () internal {
                _owner = _msgSender();
                emit OwnershipTransferred(address(0), _owner);
        }
        function owner() public view returns (address) {
                return _owner;
        }
        modifier onlyOwner() {
                require(isOwner(), "Ownable: caller is not the owner");
                _;
        }
        function isOwner() public view returns (bool) {
                return _msgSender() == _owner;
        }
        function renounceOwnership() public onlyOwner {
                emit OwnershipTransferred(_owner, address(0));
                _owner = address(0);
        }
        function transferOwnership(address newOwner) public onlyOwner {
                _transferOwnership(newOwner);
        }
        function _transferOwnership(address newOwner) internal {
                require(newOwner != address(0), "Ownable: new owner is the zero address");
                emit OwnershipTransferred(_owner, newOwner);
                _owner = newOwner;
        }
}

contract ERC20 is Context, IERC20 {
        using SafeMath for uint256;

        mapping (address => uint256) private _balances;

        mapping (address => mapping (address => uint256)) private _allowances;

        uint256 private _totalSupply;
        function totalSupply() public view returns (uint256) {
                return _totalSupply;
        }
        function balanceOf(address account) public view returns (uint256) {
```

```
        return _balances[account];
    }
    function transfer(address recipient, uint256 amount) public returns (bool) {
        _transfer(_msgSender(), recipient, amount);
        return true;
    }
    function allowance(address owner, address spender) public view returns (uint256) {
        return _allowances[owner][spender];
    }
    function approve(address spender, uint256 amount) public returns (bool) {
        _approve(_msgSender(), spender, amount);
        return true;
    }
    function transferFrom(address sender, address recipient, uint256 amount) public returns (bool) {
        _transfer(sender, recipient, amount);
        _approve(sender, _msgSender(), _allowances[sender][_msgSender()].sub(amount, "ERC20: transfer
amount exceeds allowance"));
        return true;
    }
    function increaseAllowance(address spender, uint256 addedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
        return true;
    }
    function decreaseAllowance(address spender, uint256 subtractedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].sub(subtractedValue, "ERC20:
decreased allowance below zero"));
        return true;
    }
    function _transfer(address sender, address recipient, uint256 amount) internal {
        require(sender != address(0), "ERC20: transfer from the zero address");
        require(recipient != address(0), "ERC20: transfer to the zero address");

        _balances[sender] = _balances[sender].sub(amount, "ERC20: transfer amount exceeds balance");
        _balances[recipient] = _balances[recipient].add(amount);
        emit Transfer(sender, recipient, amount);
    }
    function _mint(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: mint to the zero address");

        _totalSupply = _totalSupply.add(amount);
        _balances[account] = _balances[account].add(amount);
        emit Transfer(address(0), account, amount);
    }
    function _burn(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: burn from the zero address");

        _balances[account] = _balances[account].sub(amount, "ERC20: burn amount exceeds balance");
        _totalSupply = _totalSupply.sub(amount);
        emit Transfer(account, address(0), amount);
    }
    function _approve(address owner, address spender, uint256 amount) internal {
        require(owner != address(0), "ERC20: approve from the zero address");
        require(spender != address(0), "ERC20: approve to the zero address");

        _allowances[owner][spender] = amount;
        emit Approval(owner, spender, amount);
    }
    function _burnFrom(address account, uint256 amount) internal {
        _burn(account, amount);
        _approve(account, _msgSender(), _allowances[account][_msgSender()].sub(amount, "ERC20: burn
amount exceeds allowance"));
    }
}

contract ERC20Detailed is IERC20 {
    string private _name;
    string private _symbol;
    uint8 private _decimals;

    constructor (string memory name, string memory symbol, uint8 decimals) public {
        _name = name;
        _symbol = symbol;
        _decimals = decimals;
    }
    function name() public view returns (string memory) {
        return _name;
    }
    function symbol() public view returns (string memory) {
        return _symbol;
    }
    function decimals() public view returns (uint8) {
        return _decimals;
    }
}

library SafeMath {
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }

    function safeIncreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).add(value);
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }
    function safeDecreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).sub(value, "SafeERC20: decreased
allowance below zero");
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}

interface Controller {
    function withdraw(address, uint) external;
    function balanceOf(address) external view returns (uint);
    function earn(address, uint) external;
}

contract iVault is ERC20, ERC20Detailed {
    using SafeERC20 for IERC20;
    using Address for address;
    using SafeMath for uint256;

    IERC20 public token;

    uint public min = 9500;
    uint public constant max = 10000;
    uint public earnLowerlimit; //池内空余资金到这个值就自动 earn

    address public governance;
    address public controller;

    constructor (address _token,uint _earnLowerlimit) public ERC20Detailed(
        string(abi.encodePacked("yfii ", ERC20Detailed(_token).name())),
        string(abi.encodePacked("i", ERC20Detailed(_token).symbol())),//knownsec// iUSDT
        ERC20Detailed(_token).decimals()
    ) {
        token = IERC20(_token);
        governance = tx.origin;
        controller = 0xe14e60d0F7fb15b1A98FDE88A3415C17b023bf36;
        earnLowerlimit = _earnLowerlimit;
    }

    function balance() public view returns (uint) {//knownsec// 本合约 USDT 量 + 控制器 USDT 量
        return token.balanceOf(address(this))
                .add(Controller(controller).balanceOf(address(token)));
    }

    function setMin(uint _min) external {
        require(msg.sender == governance, "!governance");
        min = _min;
    }

    function setGovernance(address _governance) public {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) public {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setEarnLowerlimit(uint256 _earnLowerlimit) public{
      require(msg.sender == governance, "!governance");
      earnLowerlimit = _earnLowerlimit;
  }

    // Custom logic in here for how much the vault allows to be borrowed
    // Sets minimum required on-hand to keep small withdrawals cheap
    function available() public view returns (uint) {//knownsec// 可用量
        return token.balanceOf(address(this)).mul(min).div(max);
    }

    function earn() public {//knownsec// 赚取利息
        uint _bal = available();
        token.safeTransfer(controller, _bal);
        Controller(controller).earn(address(token), _bal);
    }

    function depositAll() external {//knownsec// 存入所有
```

```
        deposit(token.balanceOf(msg.sender));
    }

    function deposit(uint _amount) public {//knownsec//  存入 USDT
        uint _pool = balance();
        uint _before = token.balanceOf(address(this));
        token.safeTransferFrom(msg.sender, address(this), _amount);
        uint _after = token.balanceOf(address(this));
        _amount = _after.sub(_before); // Additional check for deflationary tokens
        uint shares = 0;
        if (totalSupply() == 0) {
            shares = _amount;
        } else {
            shares = (_amount.mul(totalSupply())).div(_pool);
        }
        _mint(msg.sender, shares);
        if (token.balanceOf(address(this))>earnLowerlimit){
          earn();
        }
    }

    function withdrawAll() external {//knownsec//  提现所有
        withdraw(balanceOf(msg.sender));
    }



    // No rebalance implementation for lower fees and faster swaps
    function withdraw(uint _shares) public {//knownsec// iUSDT 提现为 USDT
        uint r = (balance().mul(_shares)).div(totalSupply());
        _burn(msg.sender, _shares);

        // Check balance
        uint b = token.balanceOf(address(this));
        if (b < r) {
            uint _withdraw = r.sub(b);
            Controller(controller).withdraw(address(token), _withdraw);
            uint _after = token.balanceOf(address(this));
            uint _diff = _after.sub(b);
            if (_diff < _withdraw) {
                r = b.add(_diff);
            }
        }

        token.safeTransfer(msg.sender, r);
    }

    function getPricePerFullShare() public view returns (uint) {//knownsec// USDT/iUSDT  汇率
        return balance().mul(1e18).div(totalSupply());
    }
}
```

StrategyCurveYCRVVoter.sol

```
/**
  *Submitted for verification at Etherscan.io on 2020-09-06
*/

/**
  *Submitted for verification at Etherscan.io on 2020-08-28
*/

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.17;//knownsec//  指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function decimals() external view returns (uint);
    function name() external view returns (string memory);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

library SafeMath {//knownsec//  安全算数库
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {//knownsec// OpenZeppelin Address 库
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}

interface Controller {//knownsec// 控制器接口
    function vaults(address) external view returns (address);
    function rewards() external view returns (address);
}

/*

 A strategy must implement the following calls;

 - deposit()
 - withdraw(address) must exclude any tokens used in the yield - Controller role - withdraw should return to Controller
 - withdraw(uint) - Controller | Vault role - withdraw should always return to vault
 - withdrawAll() - Controller | Vault role - withdraw should always return to vault
 - balanceOf()

 Where possible, strategies must remain as immutable as possible, instead of updating variables, we update the contract by linking it in the controller

*/

interface Gauge {
    function deposit(uint) external;
    function balanceOf(address) external view returns (uint);
    function withdraw(uint) external;
}

interface Mintr {
    function mint(address) external;
}

interface UniswapRouter {
    function swapExactTokensForTokens(uint, uint, address[] calldata, address, uint) external;
}

interface yERC20 {
  function deposit(uint256 _amount) external;
  function withdraw(uint256 _amount) external;
}

interface ICurveFi {

  function get_virtual_price() external view returns (uint);
  function add_liquidity(
    uint256[4] calldata amounts,
    uint256 min_mint_amount
  ) external;
  function remove_liquidity_imbalance(
    uint256[4] calldata amounts,
    uint256 max_burn_amount
  ) external;
  function remove_liquidity(
    uint256 _amount,
    uint256[4] calldata amounts
  ) external;
  function exchange(
    int128 from, int128 to, uint256 _from_amount, uint256 _min_to_amount
  ) external;
}

contract StrategyCurveYCRVVoter {
    using SafeERC20 for IERC20;
    using Address for address;
    using SafeMath for uint256;

    address constant public want = address(0xdF5e0e81Dff6FAF3A7e52BA697820c5e32D806A8);//knownsec// yCRV
    address constant public pool = address(0xFA712EE4788C042e2B7BB55E6cb8ec569C4530c1);//knownsec// yCRV/CRV pool
    address constant public mintr = address(0xd061D61a4d941c39E5453435B6345Dc261C2fcE0);//knownsec// 矿工
    address constant public crv = address(0xD533a949740bb3306d119CC777fa900bA034cd52);//knownsec// CRV
    address constant public output = address(0xD533a949740bb3306d119CC777fa900bA034cd52);//knownsec// CRV
    address constant public unirouter = address(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);//knownsec// UniswapV2Router02
    address constant public weth = address(0xC02aaA39b223FE8D0A0e5C4F27eAD9083C756Cc2); // used for crv <> weth <> dai route

    address constant public dai = address(0x6B175474E89094C44Da98b954EedeAC495271d0F);//knownsec// DAI
    address constant public ydai = address(0x16de59092dAE5CcF4A1E6439D611fd0653f0Bd01);//knownsec// yDAI
    address constant public curve = address(0x45F783CCE6B7FF23B2ab2D70e416cdb7D6055f51);//knownsec//
y Swap

    address constant public yfii = address(0xa1d0E215a23d7030842FC67cE582a6aFa3CCaB83);


    uint public strategyfee = 0;
    uint public fee = 400;//knownsec// 40% fee/max
    uint public burnfee = 500;//knownsec// 50% burnfee/max
    uint public callfee = 100;//knownsec// 10% callfee/max
    uint constant public max = 1000;

    uint public withdrawalFee = 0;
    uint constant public withdrawalMax = 10000;

    address public governance;
    address public controller;
    address public strategyDev;
    address public burnAddress = 0xB6af2DabCEBC7d30E440714A33E5BD45CEEd103a;

    string public getName;

    address[] public swap2YFIIRouting;
    address[] public swap2TokenRouting;


    constructor() public {
        governance = tx.origin;//knownsec// 治理地址为最初的调用者地址,部署时需注意
        controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
        getName = string(
            abi.encodePacked("yfii:Strategy:",
                abi.encodePacked(IERC20(want).name(),
                    abi.encodePacked(":",IERC20(output).name())
                )
            ));
        swap2YFIIRouting = [output,weth,yfii];//knownsec//   df <> weth <> yfii
        swap2TokenRouting = [output,weth,dai];//knownsec//   df <> weth <> DAI
        doApprove();
        strategyDev = tx.origin;

    }

    function doApprove () public{
        IERC20(output).safeApprove(unirouter, 0);
        IERC20(output).safeApprove(unirouter, uint(-1));
        IERC20(dai).safeApprove(ydai, 0);
        IERC20(dai).safeApprove(ydai, uint(-1));
        IERC20(ydai).safeApprove(curve, 0);
        IERC20(ydai).safeApprove(curve, uint(-1));
    }


    function deposit() public {
        uint _want = IERC20(want).balanceOf(address(this));//knownsec//  本合约yToken 量
        if (_want > 0) {
            IERC20(want).safeApprove(pool, 0);
            IERC20(want).safeApprove(pool, _want);
            Gauge(pool).deposit(_want);//knownsec//  质押挖矿
        }

    }

    // Controller only function for creating additional rewards from dust
    function withdraw(IERC20 _asset) external returns (uint balance) {
        require(msg.sender == controller, "!controller");//knownsec//  仅控制器调用
        require(want != address(_asset), "want");
        require(crv != address(_asset), "crv");
        require(ydai != address(_asset), "ydai");
        require(dai != address(_asset), "dai");
        balance = _asset.balanceOf(address(this));
        _asset.safeTransfer(controller, balance);
    }

    // Withdraw partial funds, normally used with a vault withdrawal
    function withdraw(uint _amount) external {
        require(msg.sender == controller, "!controller");
        uint _balance = IERC20(want).balanceOf(address(this));
        if (_balance < _amount) {
            _amount = _withdrawSome(_amount.sub(_balance));
            _amount = _amount.add(_balance);
        }

        uint _fee = 0;
        if (withdrawalFee>0){//knownsec//  若有提现费,收取 withdrawalFee/withdrawalMax
            _fee = _amount.mul(withdrawalFee).div(withdrawalMax);
            IERC20(want).safeTransfer(Controller(controller).rewards(), _fee);
        }
        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds

        IERC20(want).safeTransfer(_vault, _amount.sub(_fee));
    }

    // Withdraw all funds, normally used when migrating strategies
    function withdrawAll() external returns (uint balance) {
        require(msg.sender == controller, "!controller");
        _withdrawAll();


        balance = IERC20(want).balanceOf(address(this));

        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, balance);//knownsec// 本合约所有 yCRV 转给对应 vault
    }

    function _withdrawAll() internal {
        Gauge(pool).withdraw(Gauge(pool).balanceOf(address(this)));
    }

    function harvest() public {
        require(!Address.isContract(msg.sender),"!contract");
        Mintr(mintr).mint(pool);

        doswap();
        dosplit();
        deposit();

    }
    function doswap() internal {
        uint256 _2token = IERC20(output).balanceOf(address(this)).mul(90).div(100); //90%
        uint256 _2yfii = IERC20(output).balanceOf(address(this)).mul(10).div(100);  //10%
        UniswapRouter(unirouter).swapExactTokensForTokens(_2token, 0, swap2TokenRouting, address(this),
now.add(1800));
        UniswapRouter(unirouter).swapExactTokensForTokens(_2yfii, 0, swap2YFIIRouting, address(this),
now.add(1800));

        uint _dai = IERC20(dai).balanceOf(address(this));
        if (_dai > 0) {
            yERC20(ydai).deposit(_dai);//knownsec// DAI 转换为 yDAI
        }
        uint _ydai = IERC20(ydai).balanceOf(address(this));
        if (_ydai > 0) {
            ICurveFi(curve).add_liquidity([_ydai,0,0,0],0);//knownsec// 为 curve 添加流动性 yDAI
        }

    }
    function dosplit() internal{//knownsec// 分发 yfii
        uint b = IERC20(yfii).balanceOf(address(this));
        uint _fee = b.mul(fee).div(max);//knownsec// 本合约 YFII 量 * fee / max
        uint _callfee = b.mul(callfee).div(max);//knownsec// 本合约 YFII 量 * callfee / max
        uint _burnfee = b.mul(burnfee).div(max);//knownsec// 本合约 YFII 量 * burnfee / max
        IERC20(yfii).safeTransfer(Controller(controller).rewards(), _fee); //4%  3% team +1% insurance
        IERC20(yfii).safeTransfer(msg.sender, _callfee); //call fee 1%
        IERC20(yfii).safeTransfer(burnAddress, _burnfee); //burn fee 5%

        if (strategyfee >0){
            uint _strategyfee = b.mul(strategyfee).div(max);
            IERC20(yfii).safeTransfer(strategyDev, _strategyfee);
        }
    }

    function _withdrawSome(uint256 _amount) internal returns (uint) {
        Gauge(pool).withdraw(_amount);
        return _amount;
    }

    function balanceOfWant() public view returns (uint) {
        return IERC20(want).balanceOf(address(this));
    }

    function balanceOfPool() public view returns (uint) {
        return Gauge(pool).balanceOf(address(this));
    }

    function balanceOf() public view returns (uint) {
        return balanceOfWant()
               .add(balanceOfPool());
    }

    function setGovernance(address _governance) external {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) external {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        fee = _fee;
    }
    function setStrategyFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        strategyfee = _fee;
    }
    function setCallFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        callfee = _fee;
    }
    function setBurnFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        burnfee = _fee;
    }
    function setBurnAddress(address _burnAddress) public{
        require(msg.sender == governance, "!governance");
        burnAddress = _burnAddress;
    }

    function setWithdrawalFee(uint _withdrawalFee) external {
        require(msg.sender == governance, "!governance");
        require(_withdrawalFee <=100,"fee >= 1%"); //max:1%
        withdrawalFee = _withdrawalFee;
    }
}
```

iVaultYCRV.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-04
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

pragma solidity ^0.5.16;//knownsec// 指定编译器版本

interface IERC20 {
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

contract Context {
    constructor () internal { }
    // solhint-disable-previous-line no-empty-blocks

    function _msgSender() internal view returns (address payable) {
        return msg.sender;
    }

    function _msgData() internal view returns (bytes memory) {
        this; // silence state mutability warning without generating bytecode - see
https://github.com/ethereum/solidity/issues/2691
        return msg.data;
    }
}

contract Ownable is Context {
    address private _owner;

    event OwnershipTransferred(address indexed previousOwner, address indexed newOwner);
    constructor () internal {
        _owner = _msgSender();
        emit OwnershipTransferred(address(0), _owner);
    }
    function owner() public view returns (address) {
        return _owner;
    }
    modifier onlyOwner() {
        require(isOwner(), "Ownable: caller is not the owner");
        _;
    }
    function isOwner() public view returns (bool) {
        return _msgSender() == _owner;
    }
    function renounceOwnership() public onlyOwner {
        emit OwnershipTransferred(_owner, address(0));
        _owner = address(0);
    }
    function transferOwnership(address newOwner) public onlyOwner {
        _transferOwnership(newOwner);
    }
    function _transferOwnership(address newOwner) internal {
        require(newOwner != address(0), "Ownable: new owner is the zero address");
        emit OwnershipTransferred(_owner, newOwner);
        _owner = newOwner;
    }
}

contract ERC20 is Context, IERC20 {
    using SafeMath for uint256;

    mapping (address => uint256) private _balances;

    mapping (address => mapping (address => uint256)) private _allowances;

    uint256 private _totalSupply;
    function totalSupply() public view returns (uint256) {
        return _totalSupply;
    }
    function balanceOf(address account) public view returns (uint256) {
        return _balances[account];
    }
    function transfer(address recipient, uint256 amount) public returns (bool) {
        _transfer(_msgSender(), recipient, amount);
        return true;
    }
    function allowance(address owner, address spender) public view returns (uint256) {
        return _allowances[owner][spender];
    }
    function approve(address spender, uint256 amount) public returns (bool) {
        _approve(_msgSender(), spender, amount);
        return true;
    }
    function transferFrom(address sender, address recipient, uint256 amount) public returns (bool) {
        _transfer(sender, recipient, amount);
        _approve(sender, _msgSender(), _allowances[sender][_msgSender()].sub(amount, "ERC20: transfer
amount exceeds allowance"));
        return true;
    }
    function increaseAllowance(address spender, uint256 addedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
        return true;
    }
    function decreaseAllowance(address spender, uint256 subtractedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].sub(subtractedValue, "ERC20:
decreased allowance below zero"));
        return true;
    }
    function _transfer(address sender, address recipient, uint256 amount) internal {
        require(sender != address(0), "ERC20: transfer from the zero address");
        require(recipient != address(0), "ERC20: transfer to the zero address");

        _balances[sender] = _balances[sender].sub(amount, "ERC20: transfer amount exceeds balance");
        _balances[recipient] = _balances[recipient].add(amount);
        emit Transfer(sender, recipient, amount);
    }
    function _mint(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: mint to the zero address");

        _totalSupply = _totalSupply.add(amount);
        _balances[account] = _balances[account].add(amount);
        emit Transfer(address(0), account, amount);
    }
    function _burn(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: burn from the zero address");

        _balances[account] = _balances[account].sub(amount, "ERC20: burn amount exceeds balance");
        _totalSupply = _totalSupply.sub(amount);
        emit Transfer(account, address(0), amount);
    }
    function _approve(address owner, address spender, uint256 amount) internal {
        require(owner != address(0), "ERC20: approve from the zero address");
        require(spender != address(0), "ERC20: approve to the zero address");

        _allowances[owner][spender] = amount;
        emit Approval(owner, spender, amount);
    }
    function _burnFrom(address account, uint256 amount) internal {
        _burn(account, amount);
        _approve(account, _msgSender(), _allowances[account][_msgSender()].sub(amount, "ERC20: burn
amount exceeds allowance"));
    }
}

contract ERC20Detailed is IERC20 {
    string private _name;
    string private _symbol;
    uint8 private _decimals;

    constructor (string memory name, string memory symbol, uint8 decimals) public {
        _name = name;
        _symbol = symbol;
        _decimals = decimals;
    }
    function name() public view returns (string memory) {
        return _name;
    }
    function symbol() public view returns (string memory) {
        return _symbol;
    }
    function decimals() public view returns (uint8) {
        return _decimals;
    }
}

library SafeMath {
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");
```

```
            // solhint-disable-next-line avoid-call-value
            (bool success, ) = recipient.call.value(amount)("");
            require(success, "Address: unable to send value, recipient may have reverted");
        }
}

library SafeERC20 {
        using SafeMath for uint256;
        using Address for address;

        function safeTransfer(IERC20 token, address to, uint256 value) internal {
            callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
        }

        function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
            callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
        }

        function safeApprove(IERC20 token, address spender, uint256 value) internal {
            require((value == 0) || (token.allowance(address(this), spender) == 0),
                "SafeERC20: approve from non-zero to non-zero allowance"
            );
            callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
        }

        function safeIncreaseAllowance(IERC20 token, address spender, uint256 value) internal {
            uint256 newAllowance = token.allowance(address(this), spender).add(value);
            callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
        }

        function safeDecreaseAllowance(IERC20 token, address spender, uint256 value) internal {
            uint256  newAllowance  =  token.allowance(address(this),  spender).sub(value,  "SafeERC20:  decreased
allowance below zero");
            callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
        }
        function callOptionalReturn(IERC20 token, bytes memory data) private {
            require(address(token).isContract(), "SafeERC20: call to non-contract");

            // solhint-disable-next-line avoid-low-level-calls
            (bool success, bytes memory returndata) = address(token).call(data);
            require(success, "SafeERC20: low-level call failed");

            if (returndata.length > 0) { // Return data is optional
                // solhint-disable-next-line max-line-length
                require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
            }
        }
}

interface Controller {
        function withdraw(address, uint) external;
        function balanceOf(address) external view returns (uint);
        function earn(address, uint) external;
}

contract iVault is ERC20, ERC20Detailed {//knownsec// iVualt 合约,继承自 ERC20、ERC20Detailed
        using SafeERC20 for IERC20;
        using Address for address;
        using SafeMath for uint256;

        IERC20 public token;

        uint public min = 9500;
        uint public constant max = 10000;
        uint public earnLowerlimit; //池内空余资金到这个值就自动 earn

        address public governance;
        address public controller;

        constructor (address _token,uint _earnLowerlimit) public ERC20Detailed(
            string(abi.encodePacked("yfii ", ERC20Detailed(_token).name())),
            string(abi.encodePacked("i", ERC20Detailed(_token).symbol())),//knownsec// iyCRV
            ERC20Detailed(_token).decimals()
        ) {
            token = IERC20(_token);
            governance = tx.origin;
            controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
            earnLowerlimit = _earnLowerlimit;
        }

        function balance() public view returns (uint) {//knownsec//  本合约 yCRV 量 + 控制器 yCRV 量
            return token.balanceOf(address(this))
                    .add(Controller(controller).balanceOf(address(token)));
        }

        function setMin(uint _min) external {
            require(msg.sender == governance, "!governance");
        min = _min;
    }

    function setGovernance(address _governance) public {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) public {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setEarnLowerlimit(uint256 _earnLowerlimit) public{
      require(msg.sender == governance, "!governance");
      earnLowerlimit = _earnLowerlimit;
  }

    // Custom logic in here for how much the vault allows to be borrowed
    // Sets minimum required on-hand to keep small withdrawals cheap
    function available() public view returns (uint) {//knownsec// 可用量
        return token.balanceOf(address(this)).mul(min).div(max);
    }

    function earn() public {//knownsec// 赚取利息
        uint _bal = available();
        token.safeTransfer(controller, _bal);
        Controller(controller).earn(address(token), _bal);
    }

    function depositAll() external {//knownsec// 存入所有
        deposit(token.balanceOf(msg.sender));
    }

    function deposit(uint _amount) public {//knownsec// 存入 yCRV
        uint _pool = balance();
        uint _before = token.balanceOf(address(this));
        token.safeTransferFrom(msg.sender, address(this), _amount);
        uint _after = token.balanceOf(address(this));
        _amount = _after.sub(_before); // Additional check for deflationary tokens
        uint shares = 0;
        if (totalSupply() == 0) {
            shares = _amount;
        } else {
            shares = (_amount.mul(totalSupply())).div(_pool);
        }
        _mint(msg.sender, shares);
        if (token.balanceOf(address(this))>earnLowerlimit){
          earn();
        }
    }

    function withdrawAll() external {//knownsec// 提现所有
        withdraw(balanceOf(msg.sender));
    }



    // No rebalance implementation for lower fees and faster swaps
    function withdraw(uint _shares) public {//knownsec// iyCRV 提现为yCRV
        uint r = (balance().mul(_shares)).div(totalSupply());
        _burn(msg.sender, _shares);

        // Check balance
        uint b = token.balanceOf(address(this));
        if (b < r) {
            uint _withdraw = r.sub(b);
            Controller(controller).withdraw(address(token), _withdraw);
            uint _after = token.balanceOf(address(this));
            uint _diff = _after.sub(b);
            if (_diff < _withdraw) {
                r = b.add(_diff);
            }
        }

        token.safeTransfer(msg.sender, r);
    }

    function getPricePerFullShare() public view returns (uint) {//knownsec// yCRV/iyCRV 汇率
        return balance().mul(1e18).div(totalSupply());
    }
}
```

StrategyDForceDAI.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-06
```

```
*/

/**
  *Submitted for verification at Etherscan.io on 2020-08-13
*/

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.17;//knownsec// 指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
	function totalSupply() external view returns (uint256);
	function balanceOf(address account) external view returns (uint256);
	function transfer(address recipient, uint256 amount) external returns (bool);
	function allowance(address owner, address spender) external view returns (uint256);
	function decimals() external view returns (uint);
	function name() external view returns (string memory);
	function approve(address spender, uint256 amount) external returns (bool);
	function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
	event Transfer(address indexed from, address indexed to, uint256 value);
	event Approval(address indexed owner, address indexed spender, uint256 value);
}

library SafeMath {//knownsec// 安全算数库
	function add(uint256 a, uint256 b) internal pure returns (uint256) {
		uint256 c = a + b;
		require(c >= a, "SafeMath: addition overflow");

		return c;
	}
	function sub(uint256 a, uint256 b) internal pure returns (uint256) {
		return sub(a, b, "SafeMath: subtraction overflow");
	}
	function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
		require(b <= a, errorMessage);
		uint256 c = a - b;

		return c;
	}
	function mul(uint256 a, uint256 b) internal pure returns (uint256) {
		if (a == 0) {
			return 0;
		}

		uint256 c = a * b;
		require(c / a == b, "SafeMath: multiplication overflow");

		return c;
	}
	function div(uint256 a, uint256 b) internal pure returns (uint256) {
		return div(a, b, "SafeMath: division by zero");
	}
	function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
		// Solidity only automatically asserts when dividing by 0
		require(b > 0, errorMessage);
		uint256 c = a / b;

		return c;
	}
	function mod(uint256 a, uint256 b) internal pure returns (uint256) {
		return mod(a, b, "SafeMath: modulo by zero");
	}
	function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
		require(b != 0, errorMessage);
		return a % b;
	}
}

library Address {//knownsec// OpenZeppelin Address 库
	function isContract(address account) internal view returns (bool) {
		bytes32 codehash;
		bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
		// solhint-disable-next-line no-inline-assembly
		assembly { codehash := extcodehash(account) }
		return (codehash != 0x0 && codehash != accountHash);
	}
	function toPayable(address account) internal pure returns (address payable) {
		return address(uint160(account));
	}
	function sendValue(address payable recipient, uint256 amount) internal {
		require(address(this).balance >= amount, "Address: insufficient balance");

		// solhint-disable-next-line avoid-call-value
		(bool success, ) = recipient.call.value(amount)("");
		require(success, "Address: unable to send value, recipient may have reverted");
	}
}
```

```
library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
        using SafeMath for uint256;
        using Address for address;

        function safeTransfer(IERC20 token, address to, uint256 value) internal {
                callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
        }

        function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
                callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
        }

        function safeApprove(IERC20 token, address spender, uint256 value) internal {
                require((value == 0) || (token.allowance(address(this), spender) == 0),
                        "SafeERC20: approve from non-zero to non-zero allowance"
                );
                callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
        }
        function callOptionalReturn(IERC20 token, bytes memory data) private {
                require(address(token).isContract(), "SafeERC20: call to non-contract");

                // solhint-disable-next-line avoid-low-level-calls
                (bool success, bytes memory returndata) = address(token).call(data);
                require(success, "SafeERC20: low-level call failed");

                if (returndata.length > 0) { // Return data is optional
                        // solhint-disable-next-line max-line-length
                        require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
                }
        }
}

interface Controller {//knownsec//  控制器接口
        function vaults(address) external view returns (address);
        function rewards() external view returns (address);
}

/*

  A strategy must implement the following calls;

  - deposit()
  - withdraw(address) must exclude any tokens used in the yield - Controller role - withdraw should return to
Controller
  - withdraw(uint) - Controller | Vault role - withdraw should always return to vault
  - withdrawAll() - Controller | Vault role - withdraw should always return to vault
  - balanceOf()

  Where possible, strategies must remain as immutable as possible, instead of updating variables, we update the
contract by linking it in the controller

*/

interface dRewards {
        function withdraw(uint) external;
        function getReward() external;
        function stake(uint) external;
        function balanceOf(address) external view returns (uint);
        function exit() external;
}

interface dERC20 {
    function mint(address, uint256) external;
    function redeem(address, uint) external;
    function getTokenBalance(address) external view returns (uint);
    function getExchangeRate() external view returns (uint);
}

interface UniswapRouter {
        function swapExactTokensForTokens(uint, uint, address[] calldata, address, uint) external;
}

contract StrategyDForceDAI {
        using SafeERC20 for IERC20;
        using Address for address;
        using SafeMath for uint256;

        address constant public want = address(0x6B175474E89094C44Da98b954EedeAC495271d0F);//knownsec//
DAI
        address constant public d = address(0x02285AcaafEB533e03A7306C55EC031297df9224);//knownsec// dDAI
        address constant public pool = address(0xD2fA07cD6Cd4A5A96aa86BacfA6E50bB3aaDBA8B);//knownsec//
unipool dDAI/dForce
        address constant public df = address(0x431ad2ff6a9C365805eBaD47Ee021148d6f7DBe0);//knownsec//
dForce
        address constant public output = address(0x431ad2ff6a9C365805eBaD47Ee021148d6f7DBe0);//knownsec//
dForce
```

```
    address constant public unirouter = address(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);//knownsec// UniswapV2Router02
    address constant public weth = address(0xC02aaA39b223FE8D0A0e5C4F27eAD9083C756Cc2); // used for df <> weth <> usdc route

    address constant public yfii = address(0xa1d0E215a23d7030842FC67cE582a6aFa3CCaB83);


    uint public strategyfee = 0;//knownsec// 0%
    uint public fee = 400;//knownsec// 40% fee/max
    uint public burnfee = 500;//knownsec// 50% burnfee/max
    uint public callfee = 100;//knownsec// 10% callfee/max
    uint constant public max = 1000;

    uint public withdrawalFee = 0;
    uint constant public withdrawalMax = 10000;

    address public governance;
    address public strategyDev;
    address public controller;
    address public burnAddress = 0xB6af2DabCEBC7d30E440714A33E5BD45CEEd103a;

    string public getName;

    address[] public swap2YFIIRouting;
    address[] public swap2TokenRouting;


    constructor() public {
        governance = msg.sender;//knownsec// 设置部署者为治理地址
        controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
        getName = string(
            abi.encodePacked("yfii:Strategy:",
                abi.encodePacked(IERC20(want).name(),"DF Token"
                )
            ));
        swap2YFIIRouting = [output,weth,yfii];//knownsec//   df <> weth <> yfii
        swap2TokenRouting = [output,weth,want];//knownsec//   df <> weth <> DAI
        doApprove();
        strategyDev = tx.origin;
    }

    function doApprove () public{//knownsec// 授权 unirouter 额度
        IERC20(output).safeApprove(unirouter, 0);
        IERC20(output).safeApprove(unirouter, uint(-1));
    }


    function deposit() public {//knownsec// 流动性挖矿 DAI->dDAI->质押
        uint _want = IERC20(want).balanceOf(address(this));//knownsec// 本合约 DAI 量
        if (_want > 0) {
            IERC20(want).safeApprove(d, 0);
            IERC20(want).safeApprove(d, _want);
            dERC20(d).mint(address(this), _want);//knownsec// 转为等量的 dDAI
        }

        uint _d = IERC20(d).balanceOf(address(this));//knownsec// 本合约 dDAI 量
        if (_d > 0) {
            IERC20(d).safeApprove(pool, 0);
            IERC20(d).safeApprove(pool, _d);
            dRewards(pool).stake(_d);//knownsec// 将 dDAI 质押进 unipool 池中
        }

    }

    // Controller only function for creating additional rewards from dust
    function withdraw(IERC20 _asset) external returns (uint balance) {//knownsec// 提现某资产 df/yfii/weth
        require(msg.sender == controller, "!controller");//knownsec// 仅控制器调用
        require(want != address(_asset), "want");//knownsec// 校验不为 DAI
        require(d != address(_asset), "d");//knownsec// 校验不为 dDAI
        balance = _asset.balanceOf(address(this));
        _asset.safeTransfer(controller, balance);//knownsec// 提现至控制器
    }

    // Withdraw partial funds, normally used with a vault withdrawal
    function withdraw(uint _amount) external {
        require(msg.sender == controller, "!controller");
        uint _balance = IERC20(want).balanceOf(address(this));
        if (_balance < _amount) {
            _amount = _withdrawSome(_amount.sub(_balance));
            _amount = _amount.add(_balance);
        }

        uint _fee = 0;
        if (withdrawalFee>0){//knownsec// 若有提现费,收取 withdrawalFee/withdrawalMax
            _fee = _amount.mul(withdrawalFee).div(withdrawalMax);
            IERC20(want).safeTransfer(Controller(controller).rewards(), _fee);
        }


        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, _amount.sub(_fee));
    }

    // Withdraw all funds, normally used when migrating strategies
    function withdrawAll() external returns (uint balance) {
        require(msg.sender == controller, "!controller");
        _withdrawAll();


        balance = IERC20(want).balanceOf(address(this));

        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, balance);//knownsec//  本合约所有 DAI 转给对应 vault
    }

    function _withdrawAll() internal {
        dRewards(pool).exit();//knownsec//  退出流动池
        uint _d = IERC20(d).balanceOf(address(this));
        if (_d > 0) {
            dERC20(d).redeem(address(this),_d);//knownsec// dDAI 赎回 DAI
        }
    }

    function harvest() public {
        require(!Address.isContract(msg.sender),"!contract");
        dRewards(pool).getReward();//knownsec//  提取流动池奖励 df

        doswap();
        dosplit();//分 yfii
        deposit();//knownsec//  收益 df 转为 DAI 后继续流动性挖矿
    }

    function doswap() internal {
        uint256 _2token = IERC20(output).balanceOf(address(this)).mul(90).div(100); //90%
        uint256 _2yfii = IERC20(output).balanceOf(address(this)).mul(10).div(100);    //10%
        UniswapRouter(unirouter).swapExactTokensForTokens(_2token, 0, swap2TokenRouting, address(this),
now.add(1800));//knownsec// df 收益 90%转为 DAI
        UniswapRouter(unirouter).swapExactTokensForTokens(_2yfii, 0, swap2YFIIRouting, address(this),
now.add(1800));//knownsec// df 收益 10%转为 yfii 用于分发奖励
    }
    function dosplit() internal{//knownsec//  分发 yfii
        uint b = IERC20(yfii).balanceOf(address(this));//knownsec//  本合约 YFII 量
        uint _fee = b.mul(fee).div(max);//knownsec//  本合约 YFII 量 * fee / max
        uint _callfee = b.mul(callfee).div(max);//knownsec//  本合约 YFII 量 * callfee / max
        uint _burnfee = b.mul(burnfee).div(max);//knownsec//  本合约 YFII 量 * burnfee / max
        IERC20(yfii).safeTransfer(Controller(controller).rewards(), _fee); //4%    3% team +1% insurance
        IERC20(yfii).safeTransfer(msg.sender, _callfee); //call fee 1%
        IERC20(yfii).safeTransfer(burnAddress, _burnfee); //burn fee 5%

        if (strategyfee >0){
            uint _strategyfee = b.mul(strategyfee).div(max);
            IERC20(yfii).safeTransfer(strategyDev, _strategyfee);
        }
    }

    function _withdrawSome(uint256 _amount) internal returns (uint) {//knownsec//  从 unipool 提现 dDAI,仅内
部调用
        uint _d = _amount.mul(1e18).div(dERC20(d).getExchangeRate());//knownsec// _d =  提现数 * 1e18 /
dDAI 汇率
        uint _before = IERC20(d).balanceOf(address(this));//knownsec//  提现前本合约 dDAI 量
        dRewards(pool).withdraw(_d);//knownsec// unipool 中_d 数量的 dDAI 提现到本合约
        uint _after = IERC20(d).balanceOf(address(this));//knownsec//  提现后本合约 dDAI 量
        uint _withdrew = _after.sub(_before);//knownsec//  从 unipool 提现前后的差值
        _before = IERC20(want).balanceOf(address(this));//knownsec//  赎回前本合约 DAI 量
        dERC20(d).redeem(address(this), _withdrew);//knownsec// dDAI 赎回 DAI 到本合约
        _after = IERC20(want).balanceOf(address(this));//knownsec//  赎回后本合约 DAI 量
        _withdrew = _after.sub(_before);//knownsec//  赎回前后的差值为提现额
        return _withdrew;
    }

    function balanceOfWant() public view returns (uint) {//knownsec//  本合约 DAI 量
        return IERC20(want).balanceOf(address(this));
    }

    function balanceOfPool() public view returns (uint) {//knownsec//  本合约在 unipool 的 dDAI 质押量  * dDAI
汇率  / 1e18
        return (dRewards(pool).balanceOf(address(this))).mul(dERC20(d).getExchangeRate()).div(1e18);
    }

    function getExchangeRate() public view returns (uint) {//knownsec// dDAI 汇率
        return dERC20(d).getExchangeRate();
    }

    function balanceOfD() public view returns (uint) {//knownsec// 本合约 dDAI 量
        return dERC20(d).getTokenBalance(address(this));
    }

    function balanceOf() public view returns (uint) {//knownsec// 本合约 DAI 量 + 本合约 dDAI 量 + unipool
质押量
        return balanceOfWant()
                .add(balanceOfD())
                .add(balanceOfPool());
    }

    function setGovernance(address _governance) external {//knownsec// 设置治理地址,仅治理地址调用
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) external {//knownsec// 设置控制器,仅治理地址调用
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setFee(uint256 _fee) external{//knownsec// 设置手续费,仅治理地址调用
        require(msg.sender == governance, "!governance");
        fee = _fee;
    }
    function setStrategyFee(uint256 _fee) external{//knownsec// 设置策略手续费,仅治理地址调用
        require(msg.sender == governance, "!governance");
        strategyfee = _fee;
    }
    function setCallFee(uint256 _fee) external{//knownsec// 设置调用手续费,仅治理地址调用
        require(msg.sender == governance, "!governance");
        callfee = _fee;
    }
    function setBurnFee(uint256 _fee) external{//knownsec// 设置销毁手续费,仅治理地址调用
        require(msg.sender == governance, "!governance");
        burnfee = _fee;
    }
    function setBurnAddress(address _burnAddress) public{//knownsec// 设置销毁地址,仅治理地址调用
        require(msg.sender == governance, "!governance");
        burnAddress = _burnAddress;
    }

    function setWithdrawalFee(uint _withdrawalFee) external {//knownsec// 设置提现手续费,仅治理地址调用
        require(msg.sender == governance, "!governance");
        require(_withdrawalFee <=100,"fee >= 1%"); //max:1%
        withdrawalFee = _withdrawalFee;
    }
}
```

iVaultDAI.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-04
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

pragma solidity ^0.5.16;//knownsec// 指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

contract Context {//knownsec// 上下文属性
    constructor () internal { }
    // solhint-disable-previous-line no-empty-blocks

    function _msgSender() internal view returns (address payable) {
        return msg.sender;
    }

    function _msgData() internal view returns (bytes memory) {
        this; // silence state mutability warning without generating bytecode - see
https://github.com/ethereum/solidity/issues/2691
        return msg.data;
    }
```

```
}
contract Ownable is Context {//knownsec// 所有权合约,继承自 Context
        address private _owner;

        event OwnershipTransferred(address indexed previousOwner, address indexed newOwner);
        constructor () internal {
                _owner = _msgSender();
                emit OwnershipTransferred(address(0), _owner);
        }
        function owner() public view returns (address) {
                return _owner;
        }
        modifier onlyOwner() {
                require(isOwner(), "Ownable: caller is not the owner");
                _;
        }
        function isOwner() public view returns (bool) {
                return _msgSender() == _owner;
        }
        function renounceOwnership() public onlyOwner {
                emit OwnershipTransferred(_owner, address(0));
                _owner = address(0);
        }
        function transferOwnership(address newOwner) public onlyOwner {
                _transferOwnership(newOwner);
        }
        function _transferOwnership(address newOwner) internal {
                require(newOwner != address(0), "Ownable: new owner is the zero address");
                emit OwnershipTransferred(_owner, newOwner);
                _owner = newOwner;
        }
}
contract ERC20 is Context, IERC20 {//knownsec// ERC20 代币标准实现,继承自 Context、IERC20
        using SafeMath for uint256;

        mapping (address => uint256) private _balances;

        mapping (address => mapping (address => uint256)) private _allowances;

        uint256 private _totalSupply;
        function totalSupply() public view returns (uint256) {
                return _totalSupply;
        }
        function balanceOf(address account) public view returns (uint256) {
                return _balances[account];
        }
        function transfer(address recipient, uint256 amount) public returns (bool) {
                _transfer(_msgSender(), recipient, amount);
                return true;
        }
        function allowance(address owner, address spender) public view returns (uint256) {
                return _allowances[owner][spender];
        }
        function approve(address spender, uint256 amount) public returns (bool) {
                _approve(_msgSender(), spender, amount);
                return true;
        }
        function transferFrom(address sender, address recipient, uint256 amount) public returns (bool) {
                _transfer(sender, recipient, amount);
                _approve(sender, _msgSender(), _allowances[sender][_msgSender()].sub(amount, "ERC20: transfer
amount exceeds allowance"));
                return true;
        }
        function increaseAllowance(address spender, uint256 addedValue) public returns (bool) {
                _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
                return true;
        }
        function decreaseAllowance(address spender, uint256 subtractedValue) public returns (bool) {
                _approve(_msgSender(), spender, _allowances[_msgSender()][spender].sub(subtractedValue, "ERC20:
decreased allowance below zero"));
                return true;
        }
        function _transfer(address sender, address recipient, uint256 amount) internal {
                require(sender != address(0), "ERC20: transfer from the zero address");
                require(recipient != address(0), "ERC20: transfer to the zero address");

                _balances[sender] = _balances[sender].sub(amount, "ERC20: transfer amount exceeds balance");
                _balances[recipient] = _balances[recipient].add(amount);
                emit Transfer(sender, recipient, amount);
        }
        function _mint(address account, uint256 amount) internal {
                require(account != address(0), "ERC20: mint to the zero address");

                _totalSupply = _totalSupply.add(amount);
                _balances[account] = _balances[account].add(amount);
        emit Transfer(address(0), account, amount);
    }
    function _burn(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: burn from the zero address");

        _balances[account] = _balances[account].sub(amount, "ERC20: burn amount exceeds balance");
        _totalSupply = _totalSupply.sub(amount);
        emit Transfer(account, address(0), amount);
    }
    function _approve(address owner, address spender, uint256 amount) internal {
        require(owner != address(0), "ERC20: approve from the zero address");
        require(spender != address(0), "ERC20: approve to the zero address");

        _allowances[owner][spender] = amount;
        emit Approval(owner, spender, amount);
    }
    function _burnFrom(address account, uint256 amount) internal {
        _burn(account, amount);
        _approve(account,  _msgSender(),  _allowances[account][_msgSender()].sub(amount,  "ERC20:  burn
amount exceeds allowance"));
    }
}

contract ERC20Detailed is IERC20 {//knownsec// ERC20 代币补充信息,继承自 IERC20
    string private _name;
    string private _symbol;
    uint8 private _decimals;

    constructor (string memory name, string memory symbol, uint8 decimals) public {
        _name = name;
        _symbol = symbol;
        _decimals = decimals;
    }
    function name() public view returns (string memory) {
        return _name;
    }
    function symbol() public view returns (string memory) {
        return _symbol;
    }
    function decimals() public view returns (uint8) {
        return _decimals;
    }
}

library SafeMath {//knownsec//  安全算数库
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
```

```
}
library Address {//knownsec// OpenZeppelin Address 库
        function isContract(address account) internal view returns (bool) {
                bytes32 codehash;
                bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
                // solhint-disable-next-line no-inline-assembly
                assembly { codehash := extcodehash(account) }
                return (codehash != 0x0 && codehash != accountHash);
        }
        function toPayable(address account) internal pure returns (address payable) {
                return address(uint160(account));
        }
        function sendValue(address payable recipient, uint256 amount) internal {
                require(address(this).balance >= amount, "Address: insufficient balance");

                // solhint-disable-next-line avoid-call-value
                (bool success, ) = recipient.call.value(amount)("");
                require(success, "Address: unable to send value, recipient may have reverted");
        }
}
library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
        using SafeMath for uint256;
        using Address for address;

        function safeTransfer(IERC20 token, address to, uint256 value) internal {
                callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
        }

        function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
                callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
        }

        function safeApprove(IERC20 token, address spender, uint256 value) internal {
                require((value == 0) || (token.allowance(address(this), spender) == 0),
                        "SafeERC20: approve from non-zero to non-zero allowance"
                );
                callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
        }

        function safeIncreaseAllowance(IERC20 token, address spender, uint256 value) internal {
                uint256 newAllowance = token.allowance(address(this), spender).add(value);
                callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
        }

        function safeDecreaseAllowance(IERC20 token, address spender, uint256 value) internal {
                uint256 newAllowance = token.allowance(address(this), spender).sub(value, "SafeERC20: decreased
allowance below zero");
                callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
        }
        function callOptionalReturn(IERC20 token, bytes memory data) private {
                require(address(token).isContract(), "SafeERC20: call to non-contract");

                // solhint-disable-next-line avoid-low-level-calls
                (bool success, bytes memory returndata) = address(token).call(data);
                require(success, "SafeERC20: low-level call failed");

                if (returndata.length > 0) { // Return data is optional
                        // solhint-disable-next-line max-line-length
                        require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
                }
        }
}

interface Controller {//knownsec// 控制器接口
        function withdraw(address, uint) external;
        function balanceOf(address) external view returns (uint);
        function earn(address, uint) external;
}

contract iVault is ERC20, ERC20Detailed {//knownsec// iVualt 合约,继承自 ERC20、ERC20Detailed
        using SafeERC20 for IERC20;
        using Address for address;
        using SafeMath for uint256;

        IERC20 public token;

        uint public min = 9500;
        uint public constant max = 10000;
        uint public earnLowerlimit; //池内空余资金到这个值就自动 earn

        address public governance;
        address public controller;

        constructor (address _token,uint _earnLowerlimit) public ERC20Detailed(
                string(abi.encodePacked("yfii ", ERC20Detailed(_token).name())),
            string(abi.encodePacked("i", ERC20Detailed(_token).symbol())),//knownsec// iDAI
            ERC20Detailed(_token).decimals()
    ) {
            token = IERC20(_token);
            governance = tx.origin;
            controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
            earnLowerlimit = _earnLowerlimit;
    }

    function balance() public view returns (uint) {//knownsec//  本合约 DAI 量  +  控制器 DAI 量
            return token.balanceOf(address(this))
                        .add(Controller(controller).balanceOf(address(token)));
    }

    function setMin(uint _min) external {//knownsec//  设置可借贷量比率分子,仅治理地址调用
            require(msg.sender == governance, "!governance");
            min = _min;
    }

    function setGovernance(address _governance) public {//knownsec//  设置治理地址,仅治理地址调用
            require(msg.sender == governance, "!governance");
            governance = _governance;
    }

    function setController(address _controller) public {//knownsec//  设置控制器,仅治理地址调用
            require(msg.sender == governance, "!governance");
            controller = _controller;
    }
    function setEarnLowerlimit(uint256 _earnLowerlimit) public{//knownsec//  设置自动 earn 线,仅治理地址调
用
          require(msg.sender == governance, "!governance");
          earnLowerlimit = _earnLowerlimit;
  }

    // Custom logic in here for how much the vault allows to be borrowed
    // Sets minimum required on-hand to keep small withdrawals cheap
    function available() public view returns (uint) {//knownsec//  可用量
            return token.balanceOf(address(this)).mul(min).div(max);//knownsec//  本合约 DAI 量  * min / max
    }

    function earn() public {//knownsec//  赚取利息
            uint _bal = available();
            token.safeTransfer(controller, _bal);//knownsec//  将可借贷量的 DAI 转至控制器
            Controller(controller).earn(address(token), _bal);//knownsec//  调用控制器 earn  方法
    }

    function depositAll() external {//knownsec//  存入调用者所有 DAI
            deposit(token.balanceOf(msg.sender));
    }

    function deposit(uint _amount) public {//knownsec//  存入 DAI
            uint _pool = balance();//knownsec// DAI 总量
            uint _before = token.balanceOf(address(this));//knownsec//  本合约 DAI 量
            token.safeTransferFrom(msg.sender, address(this), _amount);//knownsec//  将调用者 DAI 转入本合约
            uint _after = token.balanceOf(address(this));//knownsec//  存款转入后本合约 DAI 量
            _amount = _after.sub(_before); // Additional check for deflationary tokens //knownsec//  更新存入额为
本合约转账前后差值
            uint shares = 0;//knownsec//  相应的 iDAI 量
            if (totalSupply() == 0) {//knownsec//  若 iDAI 量为 0
                shares = _amount;
            } else {
                shares = (_amount.mul(totalSupply())).div(_pool);//knownsec//  存款 DAI 量_amount  * iDAI 总量
/ DAI 总量
            }
            _mint(msg.sender, shares);//knownsec//  存款者获取 shares 量的 iDAI 代币
            if (token.balanceOf(address(this))>earnLowerlimit){//knownsec//  若本合约  DAI  量超过最低线,调用
earn
              earn();
            }
    }

    function withdrawAll() external {//knownsec//  提现所有 iDAI 为 DAI
            withdraw(balanceOf(msg.sender));
    }



    // No rebalance implementation for lower fees and faster swaps
    function withdraw(uint _shares) public {//knownsec// iDAI 提现为 DAI
            uint r = (balance().mul(_shares)).div(totalSupply());//knownsec// r = DAI 总量  * iDAI 提取额  / iDAI 总
量
            _burn(msg.sender, _shares);//knownsec//  销毁相应 iDAI 量

            // Check balance
            uint b = token.balanceOf(address(this));//knownsec//  本合约 DAI 量
            if (b < r) {//knownsec//  提现量  >  本合约 DAI 量
                uint _withdraw = r.sub(b);//knownsec//  理论差值
                Controller(controller).withdraw(address(token), _withdraw);//knownsec// 从控制器转入理论差值
的 DAI
                uint _after = token.balanceOf(address(this));//knownsec// 转入后的本合约 DAI 量
                uint _diff = _after.sub(b);//knownsec// 转入本合约前后的 DAI 量差值,即控制器实际转入 DAI 量
                if (_diff < _withdraw) {//knownsec// 若实际差值 < 理论差值
                    r = b.add(_diff);//knownsec// 则实际提现量 = 转入前本合约 DAI 量 + 实际差值
                }
            }

            token.safeTransfer(msg.sender, r);//knownsec// 转出
        }

        function getPricePerFullShare() public view returns (uint) {//knownsec// DAI/iDAI 汇率
            return balance().mul(1e18).div(totalSupply());//knownsec// DAI 总量 * 1e18 / iDAI 总量
        }
}
```

StrategyTUSDCurve.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-07
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-29
*/

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.17;

interface IERC20 {//knownsec// 指定编译器版本
        function totalSupply() external view returns (uint256);
        function balanceOf(address account) external view returns (uint256);
        function transfer(address recipient, uint256 amount) external returns (bool);
        function allowance(address owner, address spender) external view returns (uint256);
        function decimals() external view returns (uint);
        function approve(address spender, uint256 amount) external returns (bool);
        function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
        event Transfer(address indexed from, address indexed to, uint256 value);
        event Approval(address indexed owner, address indexed spender, uint256 value);
}

library SafeMath {//knownsec// ERC20 代币标准接口
        function add(uint256 a, uint256 b) internal pure returns (uint256) {
            uint256 c = a + b;
            require(c >= a, "SafeMath: addition overflow");

            return c;
        }
        function sub(uint256 a, uint256 b) internal pure returns (uint256) {
            return sub(a, b, "SafeMath: subtraction overflow");
        }
        function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
            require(b <= a, errorMessage);
            uint256 c = a - b;

            return c;
        }
        function mul(uint256 a, uint256 b) internal pure returns (uint256) {
            if (a == 0) {
                return 0;
            }

            uint256 c = a * b;
            require(c / a == b, "SafeMath: multiplication overflow");

            return c;
        }
        function div(uint256 a, uint256 b) internal pure returns (uint256) {
            return div(a, b, "SafeMath: division by zero");
        }
        function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
            // Solidity only automatically asserts when dividing by 0
            require(b > 0, errorMessage);
            uint256 c = a / b;

            return c;
        }
        function mod(uint256 a, uint256 b) internal pure returns (uint256) {
            return mod(a, b, "SafeMath: modulo by zero");
        }
        function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
            require(b != 0, errorMessage);
            return a % b;
        }
```

```
}
library Address {//knownsec// OpenZeppelin Address 库
        function isContract(address account) internal view returns (bool) {
                bytes32 codehash;
                bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
                // solhint-disable-next-line no-inline-assembly
                assembly { codehash := extcodehash(account) }
                return (codehash != 0x0 && codehash != accountHash);
        }
        function toPayable(address account) internal pure returns (address payable) {
                return address(uint160(account));
        }
        function sendValue(address payable recipient, uint256 amount) internal {
                require(address(this).balance >= amount, "Address: insufficient balance");

                // solhint-disable-next-line avoid-call-value
                (bool success, ) = recipient.call.value(amount)("");
                require(success, "Address: unable to send value, recipient may have reverted");
        }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
        using SafeMath for uint256;
        using Address for address;

        function safeTransfer(IERC20 token, address to, uint256 value) internal {
                callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
        }

        function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
                callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
        }

        function safeApprove(IERC20 token, address spender, uint256 value) internal {
                require((value == 0) || (token.allowance(address(this), spender) == 0),
                        "SafeERC20: approve from non-zero to non-zero allowance"
                );
                callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
        }
        function callOptionalReturn(IERC20 token, bytes memory data) private {
                require(address(token).isContract(), "SafeERC20: call to non-contract");

                // solhint-disable-next-line avoid-low-level-calls
                (bool success, bytes memory returndata) = address(token).call(data);
                require(success, "SafeERC20: low-level call failed");

                if (returndata.length > 0) { // Return data is optional
                        // solhint-disable-next-line max-line-length
                        require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
                }
        }
}

interface Controller {//knownsec//  控制器接口
        function vaults(address) external view returns (address);
        function rewards() external view returns (address);
}

/*

 A strategy must implement the following calls;

 - deposit()
 - withdraw(address) must exclude any tokens used in the yield - Controller role - withdraw should return to
Controller
 - withdraw(uint) - Controller | Vault role - withdraw should always return to vault
 - withdrawAll() - Controller | Vault role - withdraw should always return to vault
 - balanceOf()

 Where possible, strategies must remain as immutable as possible, instead of updating variables, we update the
contract by linking it in the controller

*/

interface yERC20 {
    function deposit(uint) external;
    function withdraw(uint) external;
    function getPricePerFullShare() external view returns (uint);
}

interface ICurveFi {

    function get_virtual_price() external view returns (uint);
    function add_liquidity(
        uint256[4] calldata amounts,
        uint256 min_mint_amount
    ) external;
    function remove_liquidity_imbalance(
        uint256[4] calldata amounts,
        uint256 max_burn_amount
    ) external;
    function remove_liquidity(
        uint256 _amount,
        uint256[4] calldata amounts
    ) external;
    function exchange(
        int128 from, int128 to, uint256 _from_amount, uint256 _min_to_amount
    ) external;
}

contract StrategyTUSDCurve {
        using SafeERC20 for IERC20;
        using Address for address;
        using SafeMath for uint256;

        address constant public want = address(0x0000000000085d4780B73119b644AE5ecd22b376);//knownsec// TUSD
        address constant public y = address(0x73a052500105205d34Daf004eAb301916DA8190f);//knownsec// yTUSD
        address constant public ycrv = address(0xdF5e0e81Dff6FAF3A7e52BA697820c5e32D806A8);//knownsec// yCRV
        address constant public iycrv = address(0x3E3db9cc5b540d2794DB3861BE5A4887cF77E48B);//knownsec// iyCRV
        address constant public curve = address(0x45F783CCE6B7FF23B2ab2D70e416cdb7D6055f51);//knownsec// y Swap

        address constant public dai = address(0x6B175474E89094C44Da98b954EedeAC495271d0F);//knownsec// DAI
        address constant public ydai = address(0x16de59092dAE5CcF4A1E6439D611fd0653f0Bd01);//knownsec// yDAI

        address constant public usdc = address(0xA0b86991c6218b36c1d19D4a2e9Eb0cE3606eB48);//knownsec// USDC
        address constant public yusdc = address(0xd6aD7a6750A7593E092a9B218d66C0A814a3436e);//knownsec// yUSDC

        address constant public usdt = address(0xdAC17F958D2ee523a2206206994597C13D831ec7);//knownsec// USDT
        address constant public yusdt = address(0x83f798e925BcD4017Eb265844FDDAbb448f1707D);//knownsec// yUSDT

        address constant public tusd = address(0x0000000000085d4780B73119b644AE5ecd22b376);//knownsec// TUSD
        address constant public ytusd = address(0x73a052500105205d34Daf004eAb301916DA8190f);//knownsec// yTUSD


        address public governance;
        address public controller;

        constructor() public {
            governance = tx.origin;//knownsec// 治理地址为最初的调用者地址,部署时需注意
            controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
        }

        function getName() external pure returns (string memory) {
            return "yfii:StrategyTUSD:Curve";
        }

        function deposit() public {
            uint _want = IERC20(want).balanceOf(address(this));//knownsec// 本合约 TUSD 量
            if (_want > 0) {
                IERC20(want).safeApprove(y, 0);
                IERC20(want).safeApprove(y, _want);//knownsec// 授权给 yTUSD
                yERC20(y).deposit(_want);//knownsec// 将 TUSD 转换为 yTUSD
            }
            uint _y = IERC20(y).balanceOf(address(this);//knownsec// 本合约的 yTUSD 量
            if (_y > 0) {
                IERC20(y).safeApprove(curve, 0);
                IERC20(y).safeApprove(curve, _y);//knownsec// 授权给 curve
                ICurveFi(curve).add_liquidity([0,0,0,_y],0);//knownsec// 添加流动性,质押挖矿
            }
            uint _ycrv = IERC20(ycrv).balanceOf(address(this));//knownsec// 本合约 yCRV 量
            if (_ycrv > 0) {
                IERC20(ycrv).safeApprove(iycrv, 0);
                IERC20(ycrv).safeApprove(iycrv, _ycrv);//knownsec// 授权给 iyCRV
                yERC20(iycrv).deposit(_ycrv);//knownsec// 将 yCRV 转换为 iyCRV,yCRV 将再次投入策略池
            }
        }

        // Controller only function for creating additional rewards from dust
        function withdraw(IERC20 _asset) external returns (uint balance) {
            require(msg.sender == controller, "!controller");//knownsec// 仅控制器调用
        require(want != address(_asset), "want");
        require(y != address(_asset), "y");
        require(ycrv != address(_asset), "ycrv");
        require(iycrv != address(_asset), "iycrv");
        balance = _asset.balanceOf(address(this));
        _asset.safeTransfer(controller, balance);
    }

    // Withdraw partial funds, normally used with a vault withdrawal
    function withdraw(uint _amount) external {
        require(msg.sender == controller, "!controller");
        uint _balance = IERC20(want).balanceOf(address(this));
        if (_balance < _amount) {
            _amount = _withdrawSome(_amount.sub(_balance));
            _amount = _amount.add(_balance);
        }

        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, _amount);
    }

    // Withdraw all funds, normally used when migrating strategies
    function withdrawAll() external returns (uint balance) {
        require(msg.sender == controller, "!controller");
        _withdrawAll();


        balance = IERC20(want).balanceOf(address(this));

        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, balance);
    }

    function withdrawTUSD(uint256 _amount) internal returns (uint) {
        IERC20(ycrv).safeApprove(curve, 0);
        IERC20(ycrv).safeApprove(curve, _amount);//knownsec// 授权给 curve
        ICurveFi(curve).remove_liquidity(_amount, [uint256(0),0,0,0]);

        uint256 _ydai = IERC20(ydai).balanceOf(address(this));
        uint256 _yusdc = IERC20(yusdc).balanceOf(address(this));
        uint256 _yusdt = IERC20(yusdt).balanceOf(address(this));

        if (_ydai > 0) {
            IERC20(ydai).safeApprove(curve, 0);
            IERC20(ydai).safeApprove(curve, _ydai);
            ICurveFi(curve).exchange(0, 3, _ydai, 0);
        }
        if (_yusdc > 0) {
            IERC20(yusdc).safeApprove(curve, 0);
            IERC20(yusdc).safeApprove(curve, _yusdc);
            ICurveFi(curve).exchange(1, 3, _yusdc, 0);
        }
        if (_yusdt > 0) {
            IERC20(yusdt).safeApprove(curve, 0);
            IERC20(yusdt).safeApprove(curve, _yusdt);
            ICurveFi(curve).exchange(2, 3, _yusdt, 0);
        }

        uint _before = IERC20(want).balanceOf(address(this));//knownsec// 提现前本合约 TUSD 量
        yERC20(ytusd).withdraw(IERC20(ytusd).balanceOf(address(this)));//knownsec// 提现 yTUSD 为 TUSD
        uint _after = IERC20(want).balanceOf(address(this));//knownsec// 提现后本合约 TUSD 量

        return _after.sub(_before);//knownsec// 实际差值
    }

    function _withdrawAll() internal {
        uint _yycrv = IERC20(iycrv).balanceOf(address(this));
        if (_yycrv > 0) {
            yERC20(iycrv).withdraw(_yycrv);//knownesc// 提现所有 iyCRV 为 yCRV
            withdrawTUSD(IERC20(ycrv).balanceOf(address(this)));//knownsec// 提现 yCRV 数量的 TUSD
        }
    }

    function _withdrawSome(uint256 _amount) internal returns (uint) {
        // calculate amount of ycrv to withdraw for amount of _want_
        uint _ycrv = _amount.mul(1e18).div(ICurveFi(curve).get_virtual_price());
        // calculate amount of iycrv to withdraw for amount of _ycrv_
        uint _yycrv = _ycrv.mul(1e18).div(yERC20(iycrv).getPricePerFullShare());
        uint _before = IERC20(ycrv).balanceOf(address(this));
        yERC20(iycrv).withdraw(_yycrv);
        uint _after = IERC20(ycrv).balanceOf(address(this));
        return withdrawTUSD(_after.sub(_before));
    }

    function balanceOfWant() public view returns (uint) {
        return IERC20(want).balanceOf(address(this));
    }

    function balanceOfYYCRV() public view returns (uint) {
        return IERC20(iycrv).balanceOf(address(this));
    }

    function balanceOfYYCRVinYCRV() public view returns (uint) {
        return balanceOfYYCRV().mul(yERC20(iycrv).getPricePerFullShare()).div(1e18);
    }

    function balanceOfYYCRVinyTUSD() public view returns (uint) {
        return balanceOfYYCRVinYCRV().mul(ICurveFi(curve).get_virtual_price()).div(1e18);
    }

    function balanceOfYCRV() public view returns (uint) {
        return IERC20(ycrv).balanceOf(address(this));
    }

    function balanceOfYCRVyTUSD() public view returns (uint) {
        return balanceOfYCRV().mul(ICurveFi(curve).get_virtual_price()).div(1e18);
    }

    function balanceOf() public view returns (uint) {
        return balanceOfWant()
                .add(balanceOfYYCRVinyTUSD());
    }

    function setGovernance(address _governance) external {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) external {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
}
```

iVaultTUSD.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-07
*/

/**
 *Submitted for verification at Etherscan.io on 2020-09-04
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

pragma solidity ^0.5.16;//knownsec//  指定编译器版本

interface IERC20 {
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

contract Context {
    constructor () internal { }
    // solhint-disable-previous-line no-empty-blocks

    function _msgSender() internal view returns (address payable) {
        return msg.sender;
    }

    function _msgData() internal view returns (bytes memory) {
        this; // silence state mutability warning without generating bytecode - see
https://github.com/ethereum/solidity/issues/2691
        return msg.data;
    }
}

contract Ownable is Context {
    address private _owner;

    event OwnershipTransferred(address indexed previousOwner, address indexed newOwner);
    constructor () internal {
        _owner = _msgSender();
        emit OwnershipTransferred(address(0), _owner);
    }
    function owner() public view returns (address) {
        return _owner;
    }
    modifier onlyOwner() {
        require(isOwner(), "Ownable: caller is not the owner");
        _;
    }
    function isOwner() public view returns (bool) {
        return _msgSender() == _owner;
    }
    function renounceOwnership() public onlyOwner {
        emit OwnershipTransferred(_owner, address(0));
        _owner = address(0);
    }
    function transferOwnership(address newOwner) public onlyOwner {
        _transferOwnership(newOwner);
    }
    function _transferOwnership(address newOwner) internal {
        require(newOwner != address(0), "Ownable: new owner is the zero address");
        emit OwnershipTransferred(_owner, newOwner);
        _owner = newOwner;
    }
}

contract ERC20 is Context, IERC20 {
    using SafeMath for uint256;

    mapping (address => uint256) private _balances;

    mapping (address => mapping (address => uint256)) private _allowances;

    uint256 private _totalSupply;
    function totalSupply() public view returns (uint256) {
        return _totalSupply;
    }
    function balanceOf(address account) public view returns (uint256) {
        return _balances[account];
    }
    function transfer(address recipient, uint256 amount) public returns (bool) {
        _transfer(_msgSender(), recipient, amount);
        return true;
    }
    function allowance(address owner, address spender) public view returns (uint256) {
        return _allowances[owner][spender];
    }
    function approve(address spender, uint256 amount) public returns (bool) {
        _approve(_msgSender(), spender, amount);
        return true;
    }
    function transferFrom(address sender, address recipient, uint256 amount) public returns (bool) {
        _transfer(sender, recipient, amount);
        _approve(sender, _msgSender(), _allowances[sender][_msgSender()].sub(amount, "ERC20: transfer
amount exceeds allowance"));
        return true;
    }
    function increaseAllowance(address spender, uint256 addedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
        return true;
    }
    function decreaseAllowance(address spender, uint256 subtractedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].sub(subtractedValue, "ERC20:
decreased allowance below zero"));
        return true;
    }
    function _transfer(address sender, address recipient, uint256 amount) internal {
        require(sender != address(0), "ERC20: transfer from the zero address");
        require(recipient != address(0), "ERC20: transfer to the zero address");

        _balances[sender] = _balances[sender].sub(amount, "ERC20: transfer amount exceeds balance");
        _balances[recipient] = _balances[recipient].add(amount);
        emit Transfer(sender, recipient, amount);
    }
    function _mint(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: mint to the zero address");

        _totalSupply = _totalSupply.add(amount);
        _balances[account] = _balances[account].add(amount);
        emit Transfer(address(0), account, amount);
    }
    function _burn(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: burn from the zero address");

        _balances[account] = _balances[account].sub(amount, "ERC20: burn amount exceeds balance");
        _totalSupply = _totalSupply.sub(amount);
        emit Transfer(account, address(0), amount);
    }
    function _approve(address owner, address spender, uint256 amount) internal {
        require(owner != address(0), "ERC20: approve from the zero address");
        require(spender != address(0), "ERC20: approve to the zero address");

        _allowances[owner][spender] = amount;
        emit Approval(owner, spender, amount);
    }
    function _burnFrom(address account, uint256 amount) internal {
        _burn(account, amount);
        _approve(account, _msgSender(), _allowances[account][_msgSender()].sub(amount, "ERC20: burn
amount exceeds allowance"));
    }
}

contract ERC20Detailed is IERC20 {
    string private _name;
    string private _symbol;
    uint8 private _decimals;

    constructor (string memory name, string memory symbol, uint8 decimals) public {
        _name = name;
        _symbol = symbol;
        _decimals = decimals;
    }
    function name() public view returns (string memory) {
        return _name;
    }
    function symbol() public view returns (string memory) {
        return _symbol;
    }
    function decimals() public view returns (uint8) {
        return _decimals;
    }
}

library SafeMath {
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }

    function safeIncreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).add(value);
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }

    function safeDecreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).sub(value, "SafeERC20: decreased
allowance below zero");
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}

interface Controller {
    function withdraw(address, uint) external;
    function balanceOf(address) external view returns (uint);
    function earn(address, uint) external;
}

contract iVault is ERC20, ERC20Detailed {//knownsec// iVualt 合约,继承自 ERC20、ERC20Detailed
    using SafeERC20 for IERC20;
    using Address for address;
    using SafeMath for uint256;

    IERC20 public token;

    uint public min = 9500;
    uint public constant max = 10000;
    uint public earnLowerlimit; //池内空余资金到这个值就自动 earn

    address public governance;
    address public controller;

    constructor (address _token,uint _earnLowerlimit) public ERC20Detailed(
        string(abi.encodePacked("yfii ", ERC20Detailed(_token).name())),
        string(abi.encodePacked("i", ERC20Detailed(_token).symbol())),//knownsec// iTUSD
        ERC20Detailed(_token).decimals()
    ) {
        token = IERC20(_token);
        governance = tx.origin;
        controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
        earnLowerlimit = _earnLowerlimit;
    }

    function balance() public view returns (uint) {//knownsec// 本合约 TUSD 量 + 控制器 TUSD 量
        return token.balanceOf(address(this))
                .add(Controller(controller).balanceOf(address(token)));
    }

    function setMin(uint _min) external {
        require(msg.sender == governance, "!governance");
        min = _min;
    }

    function setGovernance(address _governance) public {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) public {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setEarnLowerlimit(uint256 _earnLowerlimit) public{
      require(msg.sender == governance, "!governance");
      earnLowerlimit = _earnLowerlimit;
  }

    // Custom logic in here for how much the vault allows to be borrowed
    // Sets minimum required on-hand to keep small withdrawals cheap
    function available() public view returns (uint) {//knownsec// 可用量
        return token.balanceOf(address(this)).mul(min).div(max);
    }

    function earn() public {//knownsec// 赚取利息
        uint _bal = available();
        token.safeTransfer(controller, _bal);
        Controller(controller).earn(address(token), _bal);
    }

    function depositAll() external {//knownsec// 存入调用者所有 DAI
        deposit(token.balanceOf(msg.sender));
    }

    function deposit(uint _amount) public {//knownsec// 存入 TUSD
        uint _pool = balance();
        uint _before = token.balanceOf(address(this));
        token.safeTransferFrom(msg.sender, address(this), _amount);
        uint _after = token.balanceOf(address(this));
        _amount = _after.sub(_before); // Additional check for deflationary tokens
        uint shares = 0;
        if (totalSupply() == 0) {
            shares = _amount;
        } else {
            shares = (_amount.mul(totalSupply())).div(_pool);
        }
        _mint(msg.sender, shares);
        if (token.balanceOf(address(this))>earnLowerlimit){
          earn();
        }
    }

    function withdrawAll() external {//knownsec// 提现所有 iTUSD 为 TUSD
        withdraw(balanceOf(msg.sender));
    }



    // No rebalance implementation for lower fees and faster swaps
    function withdraw(uint _shares) public {//knownsec// iTUSD 提现为 TUSD
        uint r = (balance().mul(_shares)).div(totalSupply());
        _burn(msg.sender, _shares);

        // Check balance
        uint b = token.balanceOf(address(this));
        if (b < r) {
            uint _withdraw = r.sub(b);
            Controller(controller).withdraw(address(token), _withdraw);
            uint _after = token.balanceOf(address(this));
            uint _diff = _after.sub(b);
            if (_diff < _withdraw) {
                r = b.add(_diff);
            }
        }

        token.safeTransfer(msg.sender, r);
    }

    function getPricePerFullShare() public view returns (uint) {//knownsec// TUSD/iTUSD 汇率
```

```
        return balance().mul(1e18).div(totalSupply());
    }
}
```

StrategyFortubeUSDC.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-11
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.17;//knownsec// 指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function decimals() external view returns (uint);
    function name() external view returns (string memory);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

library SafeMath {//knownsec// 安全算数库
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {//knownsec// OpenZeppelin Address 库
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}

interface Controller {//knownsec// 控制器接口
    function vaults(address) external view returns (address);
    function rewards() external view returns (address);
}

/*

 A strategy must implement the following calls;

 - deposit()
 - withdraw(address) must exclude any tokens used in the yield - Controller role - withdraw should return to Controller
 - withdraw(uint) - Controller | Vault role - withdraw should always return to vault
 - withdrawAll() - Controller | Vault role - withdraw should always return to vault
 - balanceOf()

 Where possible, strategies must remain as immutable as possible, instead of updating variables, we update the contract by linking it in the controller

*/



interface UniswapRouter {
    function swapExactTokensForTokens(uint, uint, address[] calldata, address, uint) external;
}
interface For{
    function deposit(address token, uint256 amount) external payable;
    function withdraw(address underlying, uint256 withdrawTokens) external;
    function withdrawUnderlying(address underlying, uint256 amount) external;
    function controller() view external returns(address);

}
interface IFToken {
    function balanceOf(address account) external view returns (uint256);

    function calcBalanceOfUnderlying(address owner)
        external
        view
        returns (uint256);
}

interface IBankController {

    function getFTokeAddress(address underlying)
```

```
            external
            view
            returns (address);
}
interface ForReward{
        function claimReward() external;
}

contract StrategyFortube {
        using SafeERC20 for IERC20;
        using Address for address;
        using SafeMath for uint256;

        address constant public want = address(0xA0b86991c6218b36c1d19D4a2e9Eb0cE3606eB48); //usdc
        address constant public output = address(0x1FCdcE58959f536621d76f5b7FfB955baa5A672F); //for
        address constant public unirouter = address(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);
        address constant public weth = address(0xC02aaA39b223FE8D0A0e5C4F27eAD9083C756Cc2); // used for
for <> weth <> usdc route

        address constant public yfii = address(0xa1d0E215a23d7030842FC67cE582a6aFa3CCaB83);


        address constant public fortube = address(0xdE7B3b2Fe0E7b4925107615A5b199a4EB40D9ca9);//主合约.
        address constant public fortube_reward = address(0xF8Df2E6E46AC00Cdf3616C4E35278b7704289d82); //
领取奖励的合约


        uint public strategyfee = 100;//knownsec// 10% strategyfee/max
        uint public fee = 300;//knownsec// 30% fee/max
        uint public burnfee = 500;//knownsec// 50% burnfee/max
        uint public callfee = 100;//knownsec// 10% callfee/max
        uint constant public max = 1000;

        uint public withdrawalFee = 0;
        uint constant public withdrawalMax = 10000;

        address public governance;
        address public strategyDev;
        address public controller;
        address public burnAddress = 0xB6af2DabCEBC7d30E440714A33E5BD45CEEd103a;

        string public getName;

        address[] public swap2YFIIRouting;
        address[] public swap2TokenRouting;


        constructor() public {
            governance = msg.sender;//knownsec// 设置部署者为治理地址
            controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
            getName = string(
                abi.encodePacked("yfii:Strategy:",
                    abi.encodePacked(IERC20(want).name(),"The Force Token"
                    )
                ));
            swap2YFIIRouting = [output,weth,yfii];//knownsec// for <> weth <> yfii
            swap2TokenRouting = [output,weth,want];//knownsec// for <> weth <> USDC
            doApprove();
            strategyDev = tx.origin;
        }

        function doApprove () public{//knownsec// 授权 unirouter 额度
            IERC20(output).safeApprove(unirouter, 0);
            IERC20(output).safeApprove(unirouter, uint(-1));
        }


        function deposit() public {//knownsec// 流动性挖矿
            uint _want = IERC20(want).balanceOf(address(this));
            address _controller = For(fortube).controller();
            if (_want > 0) {
                IERC20(want).safeApprove(_controller, 0);
                IERC20(want).safeApprove(_controller, _want);
                For(fortube).deposit(want,_want);
            }

        }

        // Controller only function for creating additional rewards from dust
        function withdraw(IERC20 _asset) external returns (uint balance) {//knownsec// 提现某资产 for/weth
            require(msg.sender == controller, "!controller");//knownsec// 仅控制器调用
            require(want != address(_asset), "want");//knownsec// 校验不为 USDC
            balance = _asset.balanceOf(address(this));
            _asset.safeTransfer(controller, balance);
        }

        // Withdraw partial funds, normally used with a vault withdrawal
```

```
    function withdraw(uint _amount) external {
        require(msg.sender == controller, "!controller");
        uint _balance = IERC20(want).balanceOf(address(this));
        if (_balance < _amount) {
            _amount = _withdrawSome(_amount.sub(_balance));
            _amount = _amount.add(_balance);
        }

        uint _fee = 0;
        if (withdrawalFee>0){//knownsec// 若有提现费,收取 withdrawalFee/withdrawalMax
            _fee = _amount.mul(withdrawalFee).div(withdrawalMax);
            IERC20(want).safeTransfer(Controller(controller).rewards(), _fee);
        }


        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, _amount.sub(_fee));
    }

    // Withdraw all funds, normally used when migrating strategies
    function withdrawAll() external returns (uint balance) {
        require(msg.sender == controller, "!controller");
        _withdrawAll();


        balance = IERC20(want).balanceOf(address(this));

        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, balance);//knownsec// 本合约所有 USDC 转给对应 vault
    }

    function _withdrawAll() internal {
        address _controller = For(fortube).controller();
        IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(want));
        uint b = fToken.balanceOf(address(this));
        For(fortube).withdraw(want,b);
    }

    function harvest() public {
        require(!Address.isContract(msg.sender),"!contract");
        ForReward(fortube_reward).claimReward();
        doswap();
        dosplit();//分 yfii
        deposit();
    }

    function doswap() internal {
        uint256 _2token = IERC20(output).balanceOf(address(this)).mul(90).div(100); //90%
        uint256 _2yfii = IERC20(output).balanceOf(address(this)).mul(10).div(100);  //10%
        UniswapRouter(unirouter).swapExactTokensForTokens(_2token, 0, swap2TokenRouting, address(this),
now.add(1800));
        UniswapRouter(unirouter).swapExactTokensForTokens(_2yfii, 0, swap2YFIIRouting, address(this),
now.add(1800));
    }
    function dosplit() internal{//knownsec// 分发 yfii
        uint b = IERC20(yfii).balanceOf(address(this));
        uint _fee = b.mul(fee).div(max);//knownsec// 本合约 YFII 量 * fee / max
        uint _callfee = b.mul(callfee).div(max);//knownsec// 本合约 YFII 量 * callfee / max
        uint _burnfee = b.mul(burnfee).div(max);//knownsec// 本合约 YFII 量 * burnfee / max
        IERC20(yfii).safeTransfer(Controller(controller).rewards(), _fee); //3%  3% team
        IERC20(yfii).safeTransfer(msg.sender, _callfee); //call fee 1%
        IERC20(yfii).safeTransfer(burnAddress, _burnfee); //burn fee 5%

        if (strategyfee >0){
            uint _strategyfee = b.mul(strategyfee).div(max); //1%
            IERC20(yfii).safeTransfer(strategyDev, _strategyfee);
        }
    }

    function _withdrawSome(uint256 _amount) internal returns (uint) {
        For(fortube).withdrawUnderlying(want,_amount);
        return _amount;
    }

    function balanceOfWant() public view returns (uint) {
        return IERC20(want).balanceOf(address(this));
    }

    function balanceOfPool() public view returns (uint) {
        address _controller = For(fortube).controller();
        IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(want));
        return fToken.calcBalanceOfUnderlying(address(this));
    }
    function balanceOf() public view returns (uint) {
        return balanceOfWant()
               .add(balanceOfPool());
    }

    function setGovernance(address _governance) external {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) external {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        fee = _fee;
    }
    function setStrategyFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        strategyfee = _fee;
    }
    function setCallFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        callfee = _fee;
    }
    function setBurnFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        burnfee = _fee;
    }
    function setBurnAddress(address _burnAddress) public{
        require(msg.sender == governance, "!governance");
        burnAddress = _burnAddress;
    }

    function setWithdrawalFee(uint _withdrawalFee) external {
        require(msg.sender == governance, "!governance");
        require(_withdrawalFee <=100,"fee >= 1%"); //max:1%
        withdrawalFee = _withdrawalFee;
    }
}
```

iVaultUSDC.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-07
*/

/**
 *Submitted for verification at Etherscan.io on 2020-09-04
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

pragma solidity ^0.5.16;//knownsec// 指定编译器版本

interface IERC20 {
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

contract Context {
    constructor () internal { }
    // solhint-disable-previous-line no-empty-blocks

    function _msgSender() internal view returns (address payable) {
        return msg.sender;
    }

    function _msgData() internal view returns (bytes memory) {
        this; // silence state mutability warning without generating bytecode - see
https://github.com/ethereum/solidity/issues/2691
        return msg.data;
    }
}

contract Ownable is Context {
    address private _owner;
    event OwnershipTransferred(address indexed previousOwner, address indexed newOwner);
    constructor () internal {
        _owner = _msgSender();
        emit OwnershipTransferred(address(0), _owner);
    }
    function owner() public view returns (address) {
        return _owner;
    }
    modifier onlyOwner() {
        require(isOwner(), "Ownable: caller is not the owner");
        _;
    }
    function isOwner() public view returns (bool) {
        return _msgSender() == _owner;
    }
    function renounceOwnership() public onlyOwner {
        emit OwnershipTransferred(_owner, address(0));
        _owner = address(0);
    }
    function transferOwnership(address newOwner) public onlyOwner {
        _transferOwnership(newOwner);
    }
    function _transferOwnership(address newOwner) internal {
        require(newOwner != address(0), "Ownable: new owner is the zero address");
        emit OwnershipTransferred(_owner, newOwner);
        _owner = newOwner;
    }
}

contract ERC20 is Context, IERC20 {
    using SafeMath for uint256;

    mapping (address => uint256) private _balances;

    mapping (address => mapping (address => uint256)) private _allowances;

    uint256 private _totalSupply;
    function totalSupply() public view returns (uint256) {
        return _totalSupply;
    }
    function balanceOf(address account) public view returns (uint256) {
        return _balances[account];
    }
    function transfer(address recipient, uint256 amount) public returns (bool) {
        _transfer(_msgSender(), recipient, amount);
        return true;
    }
    function allowance(address owner, address spender) public view returns (uint256) {
        return _allowances[owner][spender];
    }
    function approve(address spender, uint256 amount) public returns (bool) {
        _approve(_msgSender(), spender, amount);
        return true;
    }
    function transferFrom(address sender, address recipient, uint256 amount) public returns (bool) {
        _transfer(sender, recipient, amount);
        _approve(sender, _msgSender(), _allowances[sender][_msgSender()].sub(amount, "ERC20: transfer
amount exceeds allowance"));
        return true;
    }
    function increaseAllowance(address spender, uint256 addedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
        return true;
    }
    function decreaseAllowance(address spender, uint256 subtractedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].sub(subtractedValue, "ERC20:
decreased allowance below zero"));
        return true;
    }
    function _transfer(address sender, address recipient, uint256 amount) internal {
        require(sender != address(0), "ERC20: transfer from the zero address");
        require(recipient != address(0), "ERC20: transfer to the zero address");

        _balances[sender] = _balances[sender].sub(amount, "ERC20: transfer amount exceeds balance");
        _balances[recipient] = _balances[recipient].add(amount);
        emit Transfer(sender, recipient, amount);
    }
    function _mint(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: mint to the zero address");

        _totalSupply = _totalSupply.add(amount);
        _balances[account] = _balances[account].add(amount);
        emit Transfer(address(0), account, amount);
    }
    function _burn(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: burn from the zero address");
        _balances[account] = _balances[account].sub(amount, "ERC20: burn amount exceeds balance");
        _totalSupply = _totalSupply.sub(amount);
        emit Transfer(account, address(0), amount);
    }
    function _approve(address owner, address spender, uint256 amount) internal {
        require(owner != address(0), "ERC20: approve from the zero address");
        require(spender != address(0), "ERC20: approve to the zero address");

        _allowances[owner][spender] = amount;
        emit Approval(owner, spender, amount);
    }
    function _burnFrom(address account, uint256 amount) internal {
        _burn(account, amount);
        _approve(account, _msgSender(), _allowances[account][_msgSender()].sub(amount, "ERC20: burn
amount exceeds allowance"));
    }
}

contract ERC20Detailed is IERC20 {
    string private _name;
    string private _symbol;
    uint8 private _decimals;

    constructor (string memory name, string memory symbol, uint8 decimals) public {
        _name = name;
        _symbol = symbol;
        _decimals = decimals;
    }
    function name() public view returns (string memory) {
        return _name;
    }
    function symbol() public view returns (string memory) {
        return _symbol;
    }
    function decimals() public view returns (uint8) {
        return _decimals;
    }
}

library SafeMath {
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }

    function safeIncreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).add(value);
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }

    function safeDecreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256  newAllowance  =  token.allowance(address(this),  spender).sub(value,  "SafeERC20:  decreased
allowance below zero");
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}

interface Controller {
    function withdraw(address, uint) external;
    function balanceOf(address) external view returns (uint);
    function earn(address, uint) external;
}

contract iVault is ERC20, ERC20Detailed {//knownsec// iVualt 合约,继承自 ERC20、ERC20Detailed
    using SafeERC20 for IERC20;
    using Address for address;
    using SafeMath for uint256;

    IERC20 public token;

    uint public min = 9500;
    uint public constant max = 10000;
    uint public earnLowerlimit; //池内空余资金到这个值就自动 earn

    address public governance;
    address public controller;

    constructor (address _token,uint _earnLowerlimit) public ERC20Detailed(
        string(abi.encodePacked("yfii ", ERC20Detailed(_token).name())),
        string(abi.encodePacked("i", ERC20Detailed(_token).symbol())),//knownsec// iUSDC
        ERC20Detailed(_token).decimals()
    ) {
        token = IERC20(_token);
        governance = tx.origin;
        controller = 0x8C2a19108d8F6aEC72867E9cfb1bF517601b515f;
        earnLowerlimit = _earnLowerlimit;
    }

    function balance() public view returns (uint) {//knownsec//  本合约 USDC +  控制器 USDC 量
        return token.balanceOf(address(this))
                .add(Controller(controller).balanceOf(address(token)));
    }

    function setMin(uint _min) external {
        require(msg.sender == governance, "!governance");
        min = _min;
    }

    function setGovernance(address _governance) public {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) public {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setEarnLowerlimit(uint256 _earnLowerlimit) public{
      require(msg.sender == governance, "!governance");
      earnLowerlimit = _earnLowerlimit;
  }

    // Custom logic in here for how much the vault allows to be borrowed
    // Sets minimum required on-hand to keep small withdrawals cheap
    function available() public view returns (uint) {//knownsec//  可用量
        return token.balanceOf(address(this)).mul(min).div(max);
    }

    function earn() public {//knownsec//  赚取利息
        uint _bal = available();
        token.safeTransfer(controller, _bal);
        Controller(controller).earn(address(token), _bal);
    }

    function depositAll() external {//knownsec//  存入调用者所有 USDC
        deposit(token.balanceOf(msg.sender));
    }

    function deposit(uint _amount) public {//knownsec//  存入 USDC
        uint _pool = balance();
        uint _before = token.balanceOf(address(this));
        token.safeTransferFrom(msg.sender, address(this), _amount);
        uint _after = token.balanceOf(address(this));
        _amount = _after.sub(_before); // Additional check for deflationary tokens
        uint shares = 0;
        if (totalSupply() == 0) {
            shares = _amount;
        } else {
            shares = (_amount.mul(totalSupply())).div(_pool);
        }
        _mint(msg.sender, shares);
        if (token.balanceOf(address(this))>earnLowerlimit){
          earn();
        }
    }

    function withdrawAll() external {//knownsec//  提取所有
        withdraw(balanceOf(msg.sender));
    }



    // No rebalance implementation for lower fees and faster swaps
    function withdraw(uint _shares) public {//knownsec// iUSDC 提取为 USDC
        uint r = (balance().mul(_shares)).div(totalSupply());
        _burn(msg.sender, _shares);

        // Check balance
        uint b = token.balanceOf(address(this));
        if (b < r) {
            uint _withdraw = r.sub(b);
            Controller(controller).withdraw(address(token), _withdraw);
            uint _after = token.balanceOf(address(this));
            uint _diff = _after.sub(b);
            if (_diff < _withdraw) {
                r = b.add(_diff);
            }
        }

        token.safeTransfer(msg.sender, r);
    }

    function getPricePerFullShare() public view returns (uint) {//knownsec// USDC/iUSDC  汇率
        return balance().mul(1e18).div(totalSupply());
    }
}
```

StrategyFortubeETH.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-12
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.17;//knownsec//  指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function decimals() external view returns (uint);
    function name() external view returns (string memory);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

library SafeMath {//knownsec//  安全算数库
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {//knownsec// OpenZeppelin Address 库
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}

interface Controller {//knownsec//  控制器接口
    function vaults(address) external view returns (address);
    function rewards() external view returns (address);
}

/*

 A strategy must implement the following calls;

 - deposit()
 - withdraw(address) must exclude any tokens used in the yield - Controller role - withdraw should return to Controller
 - withdraw(uint) - Controller | Vault role - withdraw should always return to vault
 - withdrawAll() - Controller | Vault role - withdraw should always return to vault
 - balanceOf()

 Where possible, strategies must remain as immutable as possible, instead of updating variables, we update the contract by linking it in the controller

*/



interface UniswapRouter {
    function swapExactTokensForTokens(uint, uint, address[] calldata, address, uint) external;
}
interface For{
    function deposit(address token, uint256 amount) external payable;
    function withdraw(address underlying, uint256 withdrawTokens) external;
    function withdrawUnderlying(address underlying, uint256 amount) external;
    function controller() view external returns(address);

}
interface IFToken {
    function balanceOf(address account) external view returns (uint256);

    function calcBalanceOfUnderlying(address owner)
        external
        view
        returns (uint256);
}
```

```
interface IBankController {

        function getFTokeAddress(address underlying)
                external
                view
                returns (address);
}
interface ForReward{
        function claimReward() external;
}

interface WETH {
        function deposit() external payable;
        function withdraw(uint wad) external;
        event Deposit(address indexed dst, uint wad);
        event Withdrawal(address indexed src, uint wad);
}

contract StrategyFortube {
        using SafeERC20 for IERC20;
        using Address for address;
        using SafeMath for uint256;

        address constant public eth_address = address(0xEeeeeEeeeEeEeeEeEeEeeEEEeeeeEeeeeeeeEEeE);
        address  constant  public  want  =  address(0xC02aaA39b223FE8D0A0e5C4F27eAD9083C756Cc2);  //eth
//knownsec// weth
        address constant public output = address(0x1FCdcE58959f536621d76f5b7FfB955baa5A672F); //for
        address constant public unirouter = address(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);
        address constant public weth = address(0xC02aaA39b223FE8D0A0e5C4F27eAD9083C756Cc2); // used for
for <> weth <> usdc route

        address constant public yfii = address(0xa1d0E215a23d7030842FC67cE582a6aFa3CCaB83);


        address constant public fortube = address(0xdE7B3b2Fe0E7b4925107615A5b199a4EB40D9ca9);//主合约.
        address constant public fortube_reward = address(0xF8Df2E6E46AC00Cdf3616C4E35278b7704289d82); //
领取奖励的合约


        uint public strategyfee = 100;//knownsec// 10% strategyfee/max
        uint public fee = 300;//knownsec// 30% fee/max
        uint public burnfee = 500;//knownsec// 50% burnfee/max
        uint public callfee = 100;//knownsec// 10% callfee/max
        uint constant public max = 1000;

        uint public withdrawalFee = 0;
        uint constant public withdrawalMax = 10000;

        address public governance;
        address public strategyDev;
        address public controller;
        address public burnAddress = 0xB6af2DabCEBC7d30E440714A33E5BD45CEEd103a;

        string public getName;

        address[] public swap2YFIIRouting;
        address[] public swap2TokenRouting;


        constructor() public {
                governance = msg.sender;//knownsec//  设置部署者为治理地址
                controller = 0xcDCf1f9Ac816Fed665B09a00f60c885dd8848b02;
                getName = string(
                        abi.encodePacked("yfii:Strategy:",
                                abi.encodePacked(IERC20(want).name(),"The Force Token"
                                )
                        ));
                swap2YFIIRouting = [output,weth,yfii];//knownsec// for <> weth <> yfii
                swap2TokenRouting = [output,weth];//for->weth
                doApprove();
                strategyDev = tx.origin;
        }

        function doApprove () public{//knownsec//  授权 unirouter  额度
                IERC20(output).safeApprove(unirouter, 0);
                IERC20(output).safeApprove(unirouter, uint(-1));
        }



        function () external payable {
        }

        function deposit() public {//knownsec//  流动性挖矿
                uint _want = IERC20(want).balanceOf(address(this));
                address _controller = For(fortube).controller();
                if (_want > 0) {
```

```
            WETH(address(weth)).withdraw(_want); //weth->eth
            For(fortube).deposit.value(_want)(eth_address,_want);
        }

    }

    // Controller only function for creating additional rewards from dust
    function withdraw(IERC20 _asset) external returns (uint balance) {//knownsec// 提现某资产 for/weth
        require(msg.sender == controller, "!controller");//knownsec// 仅控制器调用
        require(want != address(_asset), "want");
        balance = _asset.balanceOf(address(this));
        _asset.safeTransfer(controller, balance);
    }

    // Withdraw partial funds, normally used with a vault withdrawal
    function withdraw(uint _amount) external {
        require(msg.sender == controller, "!controller");
        uint _balance = IERC20(want).balanceOf(address(this));
        if (_balance < _amount) {
            _amount = _withdrawSome(_amount.sub(_balance));
            _amount = _amount.add(_balance);
        }

        uint _fee = 0;
        if (withdrawalFee>0){//knownsec// 若有提现费,收取 withdrawalFee/withdrawalMax
            _fee = _amount.mul(withdrawalFee).div(withdrawalMax);
            IERC20(want).safeTransfer(Controller(controller).rewards(), _fee);
        }


        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, _amount.sub(_fee));
    }

    // Withdraw all funds, normally used when migrating strategies
    function withdrawAll() external returns (uint balance) {
        require(msg.sender == controller || msg.sender == governance,"!governance");
        _withdrawAll();


        balance = IERC20(want).balanceOf(address(this));

        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, balance);//knownsec// 本合约所有 WETH 转给对应 vault
    }

    function _withdrawAll() internal {
        address _controller = For(fortube).controller();
        IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(eth_address));
        uint b = fToken.calcBalanceOfUnderlying(address(this));
        _withdrawSome(b);
    }

    function harvest() public {
        require(!Address.isContract(msg.sender),"!contract");
        ForReward(fortube_reward).claimReward();
        doswap();
        dosplit();//分 yfii
        deposit();
    }

    function doswap() internal {
        uint256 _2token = IERC20(output).balanceOf(address(this)).mul(90).div(100); //90%
        uint256 _2yfii = IERC20(output).balanceOf(address(this)).mul(10).div(100);  //10%
        UniswapRouter(unirouter).swapExactTokensForTokens(_2token, 0, swap2TokenRouting, address(this),
now.add(1800));
        UniswapRouter(unirouter).swapExactTokensForTokens(_2yfii, 0, swap2YFIIRouting, address(this),
now.add(1800));
    }
    function dosplit() internal{//knownsec// 分发 yfii
        uint b = IERC20(yfii).balanceOf(address(this));
        uint _fee = b.mul(fee).div(max);//knownsec// 本合约 YFII 量 * fee / max
        uint _callfee = b.mul(callfee).div(max);//knownsec// 本合约 YFII 量 * callfee / max
        uint _burnfee = b.mul(burnfee).div(max);//knownsec// 本合约 YFII 量 * burnfee / max
        IERC20(yfii).safeTransfer(Controller(controller).rewards(), _fee); //3%  3% team
        IERC20(yfii).safeTransfer(msg.sender, _callfee); //call fee 1%
        IERC20(yfii).safeTransfer(burnAddress, _burnfee); //burn fee 5%

        if (strategyfee >0){
            uint _strategyfee = b.mul(strategyfee).div(max); //1%
            IERC20(yfii).safeTransfer(strategyDev, _strategyfee);
        }
    }

    function _withdrawSome(uint256 _amount) internal returns (uint) {
            For(fortube).withdrawUnderlying(eth_address, _amount);
            WETH(address(weth)).deposit.value(address(this).balance)();
            return _amount;
        }

        function balanceOfWant() public view returns (uint) {
            return IERC20(want).balanceOf(address(this));
        }

        function balanceOfPool() public view returns (uint) {
            address _controller = For(fortube).controller();
            IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(eth_address));
            return fToken.calcBalanceOfUnderlying(address(this));
        }


        function balanceOf() public view returns (uint) {
            return balanceOfWant()
                   .add(balanceOfPool());
        }

        function setGovernance(address _governance) external {
            require(msg.sender == governance, "!governance");
            governance = _governance;
        }

        function setController(address _controller) external {
            require(msg.sender == governance, "!governance");
            controller = _controller;
        }
        function setFee(uint256 _fee) external{
            require(msg.sender == governance, "!governance");
            fee = _fee;
        }
        function setStrategyFee(uint256 _fee) external{
            require(msg.sender == governance, "!governance");
            strategyfee = _fee;
        }
        function setCallFee(uint256 _fee) external{
            require(msg.sender == governance, "!governance");
            callfee = _fee;
        }
        function setBurnFee(uint256 _fee) external{
            require(msg.sender == governance, "!governance");
            burnfee = _fee;
        }
        function setBurnAddress(address _burnAddress) public{
            require(msg.sender == governance, "!governance");
            burnAddress = _burnAddress;
        }

        function setWithdrawalFee(uint _withdrawalFee) external {
            require(msg.sender == governance, "!governance");
            require(_withdrawalFee <=100,"fee >= 1%"); //max:1%
            withdrawalFee = _withdrawalFee;
        }
}
```

iVaultETH.sol

```
/**
  *Submitted for verification at Etherscan.io on 2020-09-12
*/

/**
  *Submitted for verification at Etherscan.io on 2020-09-01
*/

pragma solidity ^0.5.16;//knownsec// 指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

contract Context {//knownsec// 上下文属性
    constructor () internal { }
    // solhint-disable-previous-line no-empty-blocks

    function _msgSender() internal view returns (address payable) {
        return msg.sender;
    }

    function _msgData() internal view returns (bytes memory) {
        this; // silence state mutability warning without generating bytecode - see https://github.com/ethereum/solidity/issues/2691
        return msg.data;
    }
}

contract ERC20 is Context, IERC20 {//knownsec// ERC20 代币标准实现,继承自 Context、IERC20
    using SafeMath for uint256;

    mapping (address => uint256) private _balances;

    mapping (address => mapping (address => uint256)) private _allowances;

    uint256 private _totalSupply;
    function totalSupply() public view returns (uint256) {
        return _totalSupply;
    }
    function balanceOf(address account) public view returns (uint256) {
        return _balances[account];
    }
    function transfer(address recipient, uint256 amount) public returns (bool) {
        _transfer(_msgSender(), recipient, amount);
        return true;
    }
    function allowance(address owner, address spender) public view returns (uint256) {
        return _allowances[owner][spender];
    }
    function approve(address spender, uint256 amount) public returns (bool) {
        _approve(_msgSender(), spender, amount);
        return true;
    }
    function transferFrom(address sender, address recipient, uint256 amount) public returns (bool) {
        _transfer(sender, recipient, amount);
        _approve(sender, _msgSender(), _allowances[sender][_msgSender()].sub(amount, "ERC20: transfer amount exceeds allowance"));
        return true;
    }
    function increaseAllowance(address spender, uint256 addedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
        return true;
    }
    function decreaseAllowance(address spender, uint256 subtractedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].sub(subtractedValue, "ERC20: decreased allowance below zero"));
        return true;
    }
    function _transfer(address sender, address recipient, uint256 amount) internal {
        require(sender != address(0), "ERC20: transfer from the zero address");
        require(recipient != address(0), "ERC20: transfer to the zero address");

        _balances[sender] = _balances[sender].sub(amount, "ERC20: transfer amount exceeds balance");
        _balances[recipient] = _balances[recipient].add(amount);
        emit Transfer(sender, recipient, amount);
    }
    function _mint(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: mint to the zero address");

        _totalSupply = _totalSupply.add(amount);
        _balances[account] = _balances[account].add(amount);
        emit Transfer(address(0), account, amount);
    }
    function _burn(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: burn from the zero address");

        _balances[account] = _balances[account].sub(amount, "ERC20: burn amount exceeds balance");
        _totalSupply = _totalSupply.sub(amount);
        emit Transfer(account, address(0), amount);
    }
    function _approve(address owner, address spender, uint256 amount) internal {
        require(owner != address(0), "ERC20: approve from the zero address");
        require(spender != address(0), "ERC20: approve to the zero address");

        _allowances[owner][spender] = amount;
        emit Approval(owner, spender, amount);
    }
    function _burnFrom(address account, uint256 amount) internal {
        _burn(account, amount);
        _approve(account, _msgSender(), _allowances[account][_msgSender()].sub(amount, "ERC20: burn amount exceeds allowance"));
    }
}

contract ERC20Detailed is IERC20 {//knownsec// ERC20 代币补充信息,继承自 IERC20
```

```
        string private _name;
        string private _symbol;
        uint8 private _decimals;

        constructor (string memory name, string memory symbol, uint8 decimals) public {
                _name = name;
                _symbol = symbol;
                _decimals = decimals;
        }
        function name() public view returns (string memory) {
                return _name;
        }
        function symbol() public view returns (string memory) {
                return _symbol;
        }
        function decimals() public view returns (uint8) {
                return _decimals;
        }
}

library SafeMath {//knownsec// 安全算数库
        function add(uint256 a, uint256 b) internal pure returns (uint256) {
                uint256 c = a + b;
                require(c >= a, "SafeMath: addition overflow");

                return c;
        }
        function sub(uint256 a, uint256 b) internal pure returns (uint256) {
                return sub(a, b, "SafeMath: subtraction overflow");
        }
        function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
                require(b <= a, errorMessage);
                uint256 c = a - b;

                return c;
        }
        function mul(uint256 a, uint256 b) internal pure returns (uint256) {
                if (a == 0) {
                        return 0;
                }

                uint256 c = a * b;
                require(c / a == b, "SafeMath: multiplication overflow");

                return c;
        }
        function div(uint256 a, uint256 b) internal pure returns (uint256) {
                return div(a, b, "SafeMath: division by zero");
        }
        function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
                // Solidity only automatically asserts when dividing by 0
                require(b > 0, errorMessage);
                uint256 c = a / b;

                return c;
        }
        function mod(uint256 a, uint256 b) internal pure returns (uint256) {
                return mod(a, b, "SafeMath: modulo by zero");
        }
        function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
                require(b != 0, errorMessage);
                return a % b;
        }
}

library Address {//knownsec// OpenZeppelin Address 库
        function isContract(address account) internal view returns (bool) {
                bytes32 codehash;
                bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
                // solhint-disable-next-line no-inline-assembly
                assembly { codehash := extcodehash(account) }
                return (codehash != 0x0 && codehash != accountHash);
        }
        function toPayable(address account) internal pure returns (address payable) {
                return address(uint160(account));
        }
        function sendValue(address payable recipient, uint256 amount) internal {
                require(address(this).balance >= amount, "Address: insufficient balance");

                // solhint-disable-next-line avoid-call-value
                (bool success, ) = recipient.call.value(amount)("");
                require(success, "Address: unable to send value, recipient may have reverted");
        }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
        using SafeMath for uint256;
```

```
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }

    function safeIncreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).add(value);
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }

    function safeDecreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).sub(value, "SafeERC20: decreased
allowance below zero");
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}


interface WETH {//knownsec// WETH 接口
    function deposit() external payable;
    function withdraw(uint wad) external;
    event Deposit(address indexed dst, uint wad);
    event Withdrawal(address indexed src, uint wad);
}

interface Controller {//knownsec// 控制器接口
    function withdraw(address, uint) external;
    function balanceOf(address) external view returns (uint);
    function earn(address, uint) external;
}

contract iVault is ERC20, ERC20Detailed {//knownsec// iVualt 合约,继承自 ERC20、ERC20Detailed
    using SafeERC20 for IERC20;
    using Address for address;
    using SafeMath for uint256;

    IERC20 public token;

    uint public min = 9990;
    uint public constant max = 10000;
    uint public earnLowerlimit = 50 ether; //池内空余资金到这个值就自动 earn

    address public governance;
    address public controller;

    constructor (address _token) public ERC20Detailed(
        string(abi.encodePacked("yfii ", ERC20Detailed(_token).name())),
        string(abi.encodePacked("i", ERC20Detailed(_token).symbol())),//knownsec// iWETH
        ERC20Detailed(_token).decimals()
    ) {
        token = IERC20(_token);
        governance = msg.sender;
        controller = 0xcDCf1f9Ac816Fed665B09a00f60c885dd8848b02;
    }

    function balance() public view returns (uint) {//knownsec//  本合约 WETH 量 + 控制器 WETH 量
        return token.balanceOf(address(this))
                .add(Controller(controller).balanceOf(address(token)));
    }

    function setMin(uint _min) external {//knownsec//  设置可借贷量比率分子,仅治理地址调用
        require(msg.sender == governance, "!governance");
        min = _min;
    }

    function setGovernance(address _governance) public {//knownsec// 设置治理地址,仅治理地址调用
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) public {//knownsec// 设置控制器,仅治理地址调用
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setEarnLowerlimit(uint256 _earnLowerlimit) public{//knownsec// 设置自动 earn 线,仅治理地址调
用
      require(msg.sender == governance, "!governance");
      earnLowerlimit = _earnLowerlimit;
    }

    // Custom logic in here for how much the vault allows to be borrowed
    // Sets minimum required on-hand to keep small withdrawals cheap
    function available() public view returns (uint) {//knownsec// 可用量
        return token.balanceOf(address(this)).mul(min).div(max);//knownsec// 本合约 WETH 量 * min / max
    }

    function earn() public {//knownsec// 赚取利息
        uint _bal = available();
        token.safeTransfer(controller, _bal);//knownsec// 将可借贷量的 WETH 转至控制器
        Controller(controller).earn(address(token), _bal);//knownsec// 调用控制器 earn 方法
    }

    function depositAll() external {//knownsec// 存入调用者所有 WETH
        deposit(token.balanceOf(msg.sender));
    }

    function deposit(uint _amount) public {//knownsec// 存入 WETH
        uint _pool = balance();
        uint _before = token.balanceOf(address(this));
        token.safeTransferFrom(msg.sender, address(this), _amount);
        uint _after = token.balanceOf(address(this));
        _amount = _after.sub(_before); // Additional check for deflationary tokens
        uint shares = 0;
        if (totalSupply() == 0) {
            shares = _amount;
        } else {
            shares = (_amount.mul(totalSupply())).div(_pool);
        }
        _mint(msg.sender, shares);
        if (token.balanceOf(address(this))>earnLowerlimit){
          earn();
        }
    }

    function depositETH() public payable {//knownsec// 直接通过 ETH 存入
        uint _pool = balance();
        uint _before = token.balanceOf(address(this));
        uint _amount = msg.value;
        WETH(address(token)).deposit.value(_amount)();//knownsec// ETH 转为 WETH
        uint _after = token.balanceOf(address(this));
        _amount = _after.sub(_before); // Additional check for deflationary tokens
        uint shares = 0;
        if (totalSupply() == 0) {
            shares = _amount;
        } else {
            shares = (_amount.mul(totalSupply())).div(_pool);
        }
        _mint(msg.sender, shares);
    }

    function withdrawAll() external {//knownsec// 提现所有 iWETH 为 WETH
        withdraw(balanceOf(msg.sender));
    }

    function withdrawAllETH() external {
        withdrawETH(balanceOf(msg.sender));
    }



    // No rebalance implementation for lower fees and faster swaps
    function withdraw(uint _shares) public {//knownsec// 提现 iWETH 为 WETH
        uint r = (balance().mul(_shares)).div(totalSupply());
        _burn(msg.sender, _shares);

        // Check balance
        uint b = token.balanceOf(address(this));
        if (b < r) {
            uint _withdraw = r.sub(b);
```

```
                Controller(controller).withdraw(address(token), _withdraw);
                uint _after = token.balanceOf(address(this));
                uint _diff = _after.sub(b);
                if (_diff < _withdraw) {
                        r = b.add(_diff);
                }
        }

        token.safeTransfer(msg.sender, r);
    }

    // No rebalance implementation for lower fees and faster swaps
    function withdrawETH(uint _shares) public {
        uint r = (balance().mul(_shares)).div(totalSupply());
        _burn(msg.sender, _shares);

        // Check balance
        uint b = token.balanceOf(address(this));
        if (b < r) {
                uint _withdraw = r.sub(b);
                Controller(controller).withdraw(address(token), _withdraw);
                uint _after = token.balanceOf(address(this));
                uint _diff = _after.sub(b);
                if (_diff < _withdraw) {
                        r = b.add(_diff);
                }
        }

        WETH(address(token)).withdraw(r);
        address(msg.sender).transfer(r);
    }

    function getPricePerFullShare() public view returns (uint) {//knownsec// WETH/iWETH 汇率
        return balance().mul(1e18).div(totalSupply());
    }

    function () external payable {
        if (msg.sender != address(token)) {
                depositETH();
        }
    }
}
```

StrategyFortubeBUSD.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-13
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.17;//knownsec// 指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function decimals() external view returns (uint);
    function name() external view returns (string memory);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

library SafeMath {//knownsec// 安全算数库
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {//knownsec// OpenZeppelin Address 库
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}

interface Controller {//knownsec//  控制器接口
    function vaults(address) external view returns (address);
    function rewards() external view returns (address);
}

/*
```

```
 A strategy must implement the following calls;

 - deposit()
 - withdraw(address) must exclude any tokens used in the yield - Controller role - withdraw should return to
Controller
 - withdraw(uint) - Controller | Vault role - withdraw should always return to vault
 - withdrawAll() - Controller | Vault role - withdraw should always return to vault
 - balanceOf()

 Where possible, strategies must remain as immutable as possible, instead of updating variables, we update the
contract by linking it in the controller

*/



interface UniswapRouter {
    function swapExactTokensForTokens(uint, uint, address[] calldata, address, uint) external;
}
interface For{
    function deposit(address token, uint256 amount) external payable;
    function withdraw(address underlying, uint256 withdrawTokens) external;
    function withdrawUnderlying(address underlying, uint256 amount) external;
    function controller() view external returns(address);

}
interface IFToken {
    function balanceOf(address account) external view returns (uint256);

    function calcBalanceOfUnderlying(address owner)
        external
        view
        returns (uint256);
}

interface IBankController {

    function getFTokeAddress(address underlying)
        external
        view
        returns (address);
}
interface ForReward{
    function claimReward() external;
}

contract StrategyFortube {
    using SafeERC20 for IERC20;
    using Address for address;
    using SafeMath for uint256;

    address constant public want = address(0x4Fabb145d64652a948d72533023f6E7A623C7C53); //usdc
//knownsec// BUSD
    address constant public output = address(0x1FCdcE58959f536621d76f5b7FfB955baa5A672F); //for
    address                   constant                 public              unirouter               =
address(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);//knownsec// UniswapV2Router02
    address constant public weth = address(0xC02aaA39b223FE8D0A0e5C4F27eAD9083C756Cc2); // used for
for <> weth <> usdc route

    address constant public yfii = address(0xa1d0E215a23d7030842FC67cE582a6aFa3CCaB83);


    address constant public fortube = address(0xdE7B3b2Fe0E7b4925107615A5b199a4EB40D9ca9);//主合约.
    address constant public fortube_reward = address(0xF8Df2E6E46AC00Cdf3616C4E35278b7704289d82); //
领取奖励的合约


    uint public strategyfee = 100;//knownsec// 10% strategyfee/max
    uint public fee = 300;//knownsec// 30% fee/max
    uint public burnfee = 500;//knownsec// 50% burnfee/max
    uint public callfee = 100;//knownsec// 10% callfee/max
    uint constant public max = 1000;

    uint public withdrawalFee = 0;
    uint constant public withdrawalMax = 10000;

    address public governance;
    address public strategyDev;
    address public controller;
    address public burnAddress = 0xB6af2DabCEBC7d30E440714A33E5BD45CEEd103a;

    string public getName;

    address[] public swap2YFIIRouting;
    address[] public swap2TokenRouting;
```

```
constructor() public {
        governance = msg.sender;//knownsec// 设置部署者为治理地址
        controller = 0xcDCf1f9Ac816Fed665B09a00f60c885dd8848b02;
        getName = string(
                abi.encodePacked("yfii:Strategy:",
                        abi.encodePacked(IERC20(want).name(),"The Force Token"
                        )
                ));
        swap2YFIIRouting = [output,weth,yfii];//knownsec// for <> weth <> yfii
        swap2TokenRouting = [output,weth,want];//knownsec// for <> weth <> BUSD
        doApprove();
        strategyDev = tx.origin;
}

function doApprove () public{//knownsec// 授权 unirouter 额度
        IERC20(output).safeApprove(unirouter, 0);
        IERC20(output).safeApprove(unirouter, uint(-1));
}


function deposit() public {//knownsec// 流动性挖矿
        uint _want = IERC20(want).balanceOf(address(this));
        address _controller = For(fortube).controller();
        if (_want > 0) {
                IERC20(want).safeApprove(_controller, 0);
                IERC20(want).safeApprove(_controller, _want);
                For(fortube).deposit(want,_want);
        }

}

// Controller only function for creating additional rewards from dust
function withdraw(IERC20 _asset) external returns (uint balance) {//knownsec// 提现某资产 for/weth
        require(msg.sender == controller, "!controller");//knownsec// 仅控制器调用
        require(want != address(_asset), "want");//knownsec// 校验不为 BUSD
        balance = _asset.balanceOf(address(this));
        _asset.safeTransfer(controller, balance);
}

// Withdraw partial funds, normally used with a vault withdrawal
function withdraw(uint _amount) external {
        require(msg.sender == controller, "!controller");
        uint _balance = IERC20(want).balanceOf(address(this));
        if (_balance < _amount) {
                _amount = _withdrawSome(_amount.sub(_balance));
                _amount = _amount.add(_balance);
        }

        uint _fee = 0;
        if (withdrawalFee>0){//knownsec// 若有提现费,收取 withdrawalFee/withdrawalMax
                _fee = _amount.mul(withdrawalFee).div(withdrawalMax);
                IERC20(want).safeTransfer(Controller(controller).rewards(), _fee);
        }


        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, _amount.sub(_fee));
}

// Withdraw all funds, normally used when migrating strategies
function withdrawAll() external returns (uint balance) {
        require(msg.sender == controller || msg.sender == governance,"!governance");
        _withdrawAll();


        balance = IERC20(want).balanceOf(address(this));

        address _vault = Controller(controller).vaults(address(want));
        require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
        IERC20(want).safeTransfer(_vault, balance);//knownsec// 本合约所有 BUSD 转给对应 vault
}

function _withdrawAll() internal {
        address _controller = For(fortube).controller();
        IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(want));
        uint b = fToken.balanceOf(address(this));
        For(fortube).withdraw(want,b);
}

function harvest() public {
        require(!Address.isContract(msg.sender),"!contract");
        ForReward(fortube_reward).claimReward();
        doswap();
        dosplit();//分 yfii
        deposit();
```

```
    }

    function doswap() internal {
        uint256 _2token = IERC20(output).balanceOf(address(this)).mul(90).div(100); //90%
        uint256 _2yfii = IERC20(output).balanceOf(address(this)).mul(10).div(100);   //10%
        UniswapRouter(unirouter).swapExactTokensForTokens(_2token, 0, swap2TokenRouting, address(this),
now.add(1800));
        UniswapRouter(unirouter).swapExactTokensForTokens(_2yfii, 0, swap2YFIIRouting, address(this),
now.add(1800));
    }
    function dosplit() internal{//knownsec// 分发 yfii
        uint b = IERC20(yfii).balanceOf(address(this));
        uint _fee = b.mul(fee).div(max);//knownsec// 本合约 YFII 量 * fee / max
        uint _callfee = b.mul(callfee).div(max);//knownsec// 本合约 YFII 量 * callfee / max
        uint _burnfee = b.mul(burnfee).div(max);//knownsec// 本合约 YFII 量 * burnfee / max
        IERC20(yfii).safeTransfer(Controller(controller).rewards(), _fee); //3%   3% team
        IERC20(yfii).safeTransfer(msg.sender, _callfee); //call fee 1%
        IERC20(yfii).safeTransfer(burnAddress, _burnfee); //burn fee 5%

        if (strategyfee >0){
            uint _strategyfee = b.mul(strategyfee).div(max); //1%
            IERC20(yfii).safeTransfer(strategyDev, _strategyfee);
        }
    }

    function _withdrawSome(uint256 _amount) internal returns (uint) {
        For(fortube).withdrawUnderlying(want,_amount);
        return _amount;
    }

    function balanceOfWant() public view returns (uint) {
        return IERC20(want).balanceOf(address(this));
    }

    function balanceOfPool() public view returns (uint) {
        address _controller = For(fortube).controller();
        IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(want));
        return fToken.calcBalanceOfUnderlying(address(this));
    }


    function balanceOf() public view returns (uint) {
        return balanceOfWant()
               .add(balanceOfPool());
    }

    function setGovernance(address _governance) external {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) external {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        fee = _fee;
    }
    function setStrategyFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        strategyfee = _fee;
    }
    function setCallFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        callfee = _fee;
    }
    function setBurnFee(uint256 _fee) external{
        require(msg.sender == governance, "!governance");
        burnfee = _fee;
    }
    function setBurnAddress(address _burnAddress) public{
        require(msg.sender == governance, "!governance");
        burnAddress = _burnAddress;
    }

    function setWithdrawalFee(uint _withdrawalFee) external {
        require(msg.sender == governance, "!governance");
        require(_withdrawalFee <=100,"fee >= 1%"); //max:1%
        withdrawalFee = _withdrawalFee;
    }
}
```

iVaultBUSD.sol

```
/**
```

```
 *Submitted for verification at Etherscan.io on 2020-09-13
*/

/**
 *Submitted for verification at Etherscan.io on 2020-09-04
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

pragma solidity ^0.5.16;//knownsec// 指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
	function totalSupply() external view returns (uint256);
	function balanceOf(address account) external view returns (uint256);
	function transfer(address recipient, uint256 amount) external returns (bool);
	function allowance(address owner, address spender) external view returns (uint256);
	function approve(address spender, uint256 amount) external returns (bool);
	function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
	event Transfer(address indexed from, address indexed to, uint256 value);
	event Approval(address indexed owner, address indexed spender, uint256 value);
}

contract Context {//knownsec// 上下文属性
	constructor () internal { }
	// solhint-disable-previous-line no-empty-blocks

	function _msgSender() internal view returns (address payable) {
		return msg.sender;
	}

	function _msgData() internal view returns (bytes memory) {
		this; // silence state mutability warning without generating bytecode - see
https://github.com/ethereum/solidity/issues/2691
		return msg.data;
	}
}

contract Ownable is Context {//knownsec// 所有权合约,继承自 Context
	address private _owner;

	event OwnershipTransferred(address indexed previousOwner, address indexed newOwner);
	constructor () internal {
		_owner = _msgSender();
		emit OwnershipTransferred(address(0), _owner);
	}
	function owner() public view returns (address) {
		return _owner;
	}
	modifier onlyOwner() {
		require(isOwner(), "Ownable: caller is not the owner");
		_;
	}
	function isOwner() public view returns (bool) {
		return _msgSender() == _owner;
	}
	function renounceOwnership() public onlyOwner {
		emit OwnershipTransferred(_owner, address(0));
		_owner = address(0);
	}
	function transferOwnership(address newOwner) public onlyOwner {
		_transferOwnership(newOwner);
	}
	function _transferOwnership(address newOwner) internal {
		require(newOwner != address(0), "Ownable: new owner is the zero address");
		emit OwnershipTransferred(_owner, newOwner);
		_owner = newOwner;
	}
}

contract ERC20 is Context, IERC20 {//knownsec// ERC20 代币标准实现,继承自 Context、IERC20
	using SafeMath for uint256;

	mapping (address => uint256) private _balances;

	mapping (address => mapping (address => uint256)) private _allowances;

	uint256 private _totalSupply;
	function totalSupply() public view returns (uint256) {
		return _totalSupply;
	}
	function balanceOf(address account) public view returns (uint256) {
		return _balances[account];
	}
	function transfer(address recipient, uint256 amount) public returns (bool) {
		_transfer(_msgSender(), recipient, amount);
```

```
        return true;
    }
    function allowance(address owner, address spender) public view returns (uint256) {
        return _allowances[owner][spender];
    }
    function approve(address spender, uint256 amount) public returns (bool) {
        _approve(_msgSender(), spender, amount);
        return true;
    }
    function transferFrom(address sender, address recipient, uint256 amount) public returns (bool) {
        _transfer(sender, recipient, amount);
        _approve(sender, _msgSender(), _allowances[sender][_msgSender()].sub(amount, "ERC20: transfer
amount exceeds allowance"));
        return true;
    }
    function increaseAllowance(address spender, uint256 addedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
        return true;
    }
    function decreaseAllowance(address spender, uint256 subtractedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].sub(subtractedValue, "ERC20:
decreased allowance below zero"));
        return true;
    }
    function _transfer(address sender, address recipient, uint256 amount) internal {
        require(sender != address(0), "ERC20: transfer from the zero address");
        require(recipient != address(0), "ERC20: transfer to the zero address");

        _balances[sender] = _balances[sender].sub(amount, "ERC20: transfer amount exceeds balance");
        _balances[recipient] = _balances[recipient].add(amount);
        emit Transfer(sender, recipient, amount);
    }
    function _mint(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: mint to the zero address");

        _totalSupply = _totalSupply.add(amount);
        _balances[account] = _balances[account].add(amount);
        emit Transfer(address(0), account, amount);
    }
    function _burn(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: burn from the zero address");

        _balances[account] = _balances[account].sub(amount, "ERC20: burn amount exceeds balance");
        _totalSupply = _totalSupply.sub(amount);
        emit Transfer(account, address(0), amount);
    }
    function _approve(address owner, address spender, uint256 amount) internal {
        require(owner != address(0), "ERC20: approve from the zero address");
        require(spender != address(0), "ERC20: approve to the zero address");

        _allowances[owner][spender] = amount;
        emit Approval(owner, spender, amount);
    }
    function _burnFrom(address account, uint256 amount) internal {
        _burn(account, amount);
        _approve(account, _msgSender(), _allowances[account][_msgSender()].sub(amount, "ERC20: burn
amount exceeds allowance"));
    }
}

contract ERC20Detailed is IERC20 {//knownsec// ERC20 代币补充信息,继承自 IERC20
    string private _name;
    string private _symbol;
    uint8 private _decimals;

    constructor (string memory name, string memory symbol, uint8 decimals) public {
        _name = name;
        _symbol = symbol;
        _decimals = decimals;
    }
    function name() public view returns (string memory) {
        return _name;
    }
    function symbol() public view returns (string memory) {
        return _symbol;
    }
    function decimals() public view returns (uint8) {
        return _decimals;
    }
}

library SafeMath {//knownsec// 安全算数库
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {//knownsec// OpenZeppelin Address 库
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }

    function safeIncreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).add(value);
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }

    function safeDecreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).sub(value, "SafeERC20: decreased
allowance below zero");
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
        }
        function callOptionalReturn(IERC20 token, bytes memory data) private {
                require(address(token).isContract(), "SafeERC20: call to non-contract");

                // solhint-disable-next-line avoid-low-level-calls
                (bool success, bytes memory returndata) = address(token).call(data);
                require(success, "SafeERC20: low-level call failed");

                if (returndata.length > 0) { // Return data is optional
                        // solhint-disable-next-line max-line-length
                        require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
                }
        }
}

interface Controller {
        function withdraw(address, uint) external;
        function balanceOf(address) external view returns (uint);
        function earn(address, uint) external;
}

contract iVault is ERC20, ERC20Detailed {//knownsec// iVualt 合约,继承自 ERC20、ERC20Detailed
        using SafeERC20 for IERC20;
        using Address for address;
        using SafeMath for uint256;

        IERC20 public token;

        uint public min = 9500;
        uint public constant max = 10000;
        uint public earnLowerlimit; //池内空余资金到这个值就自动 earn

        address public governance;
        address public controller;

        constructor (address _token,uint _earnLowerlimit) public ERC20Detailed(
                string(abi.encodePacked("yfii ", ERC20Detailed(_token).name())),
                string(abi.encodePacked("i", ERC20Detailed(_token).symbol())),//knownsec// iBUSD
                ERC20Detailed(_token).decimals()
        ) {
                token = IERC20(_token);
                governance = tx.origin;
                controller = 0xcDCf1f9Ac816Fed665B09a00f60c885dd8848b02;
                earnLowerlimit = _earnLowerlimit;
        }

        function balance() public view returns (uint) {//knownsec// 本合约 BUSD 量 + 控制器 iBUSD 量
                return token.balanceOf(address(this))
                                .add(Controller(controller).balanceOf(address(token)));
        }

        function setMin(uint _min) external {
                require(msg.sender == governance, "!governance");
                min = _min;
        }

        function setGovernance(address _governance) public {
                require(msg.sender == governance, "!governance");
                governance = _governance;
        }

        function setController(address _controller) public {
                require(msg.sender == governance, "!governance");
                controller = _controller;
        }
        function setEarnLowerlimit(uint256 _earnLowerlimit) public{
            require(msg.sender == governance, "!governance");
            earnLowerlimit = _earnLowerlimit;
    }

        // Custom logic in here for how much the vault allows to be borrowed
        // Sets minimum required on-hand to keep small withdrawals cheap
        function available() public view returns (uint) {//knownsec// 可用量
                return token.balanceOf(address(this)).mul(min).div(max);
        }

        function earn() public {//knownsec// 赚取利息
                uint _bal = available();
                token.safeTransfer(controller, _bal);
                Controller(controller).earn(address(token), _bal);
        }

        function depositAll() external {//knownsec// 存入调用者所有 DAI
                deposit(token.balanceOf(msg.sender));
        }

        function deposit(uint _amount) public {//knownsec// 存入 BUSD
        uint _pool = balance();
        uint _before = token.balanceOf(address(this));
        token.safeTransferFrom(msg.sender, address(this), _amount);
        uint _after = token.balanceOf(address(this));
        _amount = _after.sub(_before); // Additional check for deflationary tokens
        uint shares = 0;
        if (totalSupply() == 0) {
            shares = _amount;
        } else {
            shares = (_amount.mul(totalSupply())).div(_pool);
        }
        _mint(msg.sender, shares);
        if (token.balanceOf(address(this))>earnLowerlimit){
          earn();
        }
    }

    function withdrawAll() external {//knownsec// 提现所有 iBUSD 为 BUSD
        withdraw(balanceOf(msg.sender));
    }


    // No rebalance implementation for lower fees and faster swaps
    function withdraw(uint _shares) public {//knownsec// iBUSD 提现为 BUSD
        uint r = (balance().mul(_shares)).div(totalSupply());
        _burn(msg.sender, _shares);

        // Check balance
        uint b = token.balanceOf(address(this));
        if (b < r) {
            uint _withdraw = r.sub(b);
            Controller(controller).withdraw(address(token), _withdraw);
            uint _after = token.balanceOf(address(this));
            uint _diff = _after.sub(b);
            if (_diff < _withdraw) {
                r = b.add(_diff);
            }
        }

        token.safeTransfer(msg.sender, r);
    }

    function getPricePerFullShare() public view returns (uint) {//knownsec// BUSD/iBUSD 汇率
        return balance().mul(1e18).div(totalSupply());
    }
}
```

StrategyFortubeHBTC.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-15
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

// SPDX-License-Identifier: MIT

pragma solidity ^0.5.17;//knownsec// 指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口//knownsec// 安全算数库
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function decimals() external view returns (uint);
    function name() external view returns (string memory);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

library SafeMath {//knownsec// 安全算数库
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
            require(b <= a, errorMessage);
            uint256 c = a - b;

            return c;
        }
        function mul(uint256 a, uint256 b) internal pure returns (uint256) {
            if (a == 0) {
                return 0;
            }

            uint256 c = a * b;
            require(c / a == b, "SafeMath: multiplication overflow");

            return c;
        }
        function div(uint256 a, uint256 b) internal pure returns (uint256) {
            return div(a, b, "SafeMath: division by zero");
        }
        function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
            // Solidity only automatically asserts when dividing by 0
            require(b > 0, errorMessage);
            uint256 c = a / b;

            return c;
        }
        function mod(uint256 a, uint256 b) internal pure returns (uint256) {
            return mod(a, b, "SafeMath: modulo by zero");
        }
        function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
            require(b != 0, errorMessage);
            return a % b;
        }
}

library Address {//knownsec// OpenZeppelin Address 库
        function isContract(address account) internal view returns (bool) {
            bytes32 codehash;
            bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
            // solhint-disable-next-line no-inline-assembly
            assembly { codehash := extcodehash(account) }
            return (codehash != 0x0 && codehash != accountHash);
        }
        function toPayable(address account) internal pure returns (address payable) {
            return address(uint160(account));
        }
        function sendValue(address payable recipient, uint256 amount) internal {
            require(address(this).balance >= amount, "Address: insufficient balance");

            // solhint-disable-next-line avoid-call-value
            (bool success, ) = recipient.call.value(amount)("");
            require(success, "Address: unable to send value, recipient may have reverted");
        }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
        using SafeMath for uint256;
        using Address for address;

        function safeTransfer(IERC20 token, address to, uint256 value) internal {
            callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
        }

        function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
            callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
        }

        function safeApprove(IERC20 token, address spender, uint256 value) internal {
            require((value == 0) || (token.allowance(address(this), spender) == 0),
                "SafeERC20: approve from non-zero to non-zero allowance"
            );
            callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
        }
        function callOptionalReturn(IERC20 token, bytes memory data) private {
            require(address(token).isContract(), "SafeERC20: call to non-contract");

            // solhint-disable-next-line avoid-low-level-calls
            (bool success, bytes memory returndata) = address(token).call(data);
            require(success, "SafeERC20: low-level call failed");

            if (returndata.length > 0) { // Return data is optional
                // solhint-disable-next-line max-line-length
                require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
            }
        }
}

interface Controller {//knownsec//  控制器接口
```

```
    function vaults(address) external view returns (address);
    function rewards() external view returns (address);
}

/*

 A strategy must implement the following calls;

 - deposit()
 - withdraw(address) must exclude any tokens used in the yield - Controller role - withdraw should return to
Controller
 - withdraw(uint) - Controller | Vault role - withdraw should always return to vault
 - withdrawAll() - Controller | Vault role - withdraw should always return to vault
 - balanceOf()

 Where possible, strategies must remain as immutable as possible, instead of updating variables, we update the
contract by linking it in the controller

*/



interface UniswapRouter {
    function swapExactTokensForTokens(uint, uint, address[] calldata, address, uint) external;
}
interface For{
    function deposit(address token, uint256 amount) external payable;
    function withdraw(address underlying, uint256 withdrawTokens) external;
    function withdrawUnderlying(address underlying, uint256 amount) external;
    function controller() view external returns(address);

}
interface IFToken {
    function balanceOf(address account) external view returns (uint256);

    function calcBalanceOfUnderlying(address owner)
        external
        view
        returns (uint256);
}

interface IBankController {

    function getFTokeAddress(address underlying)
        external
        view
        returns (address);
}
interface ForReward{
    function claimReward() external;
}

contract StrategyFortube {
    using SafeERC20 for IERC20;
    using Address for address;
    using SafeMath for uint256;

    address constant public want = address(0x0316EB71485b0Ab14103307bf65a021042c6d380); //hbtc
    address constant public output = address(0x1FCdcE58959f536621d76f5b7FfB955baa5A672F); //for
    address constant public unirouter = address(0x7a250d5630B4cF539739dF2C5dAcb4c659F2488D);
    address constant public weth = address(0xC02aaA39b223FE8D0A0e5C4F27eAD9083C756Cc2); // used for
for <> weth <> usdc route

    address constant public yfii = address(0xa1d0E215a23d7030842FC67cE582a6aFa3CCaB83);


    address constant public fortube = address(0xdE7B3b2Fe0E7b4925107615A5b199a4EB40D9ca9);//主合约.
    address constant public fortube_reward = address(0xF8Df2E6E46AC00Cdf3616C4E35278b7704289d82); //
领取奖励的合约


    uint public strategyfee = 100;//knownsec// 10% strategyfee/max
    uint public fee = 300;//knownsec// 30% fee/max
    uint public burnfee = 500;//knownsec// 50% burnfee/max
    uint public callfee = 100;//knownsec// 10% callfee/max
    uint constant public max = 1000;

    uint public withdrawalFee = 0;
    uint constant public withdrawalMax = 10000;

    address public governance;
    address public strategyDev;
    address public controller;
    address public burnAddress = 0xB6af2DabCEBC7d30E440714A33E5BD45CEEd103a;

    string public getName;
```

```
address[] public swap2YFIIRouting;
address[] public swap2TokenRouting;


constructor() public {
      governance = msg.sender;//knownsec// 设置部署者为治理地址
      controller = 0xcDCf1f9Ac816Fed665B09a00f60c885dd8848b02;
      getName = string(
            abi.encodePacked("yfii:Strategy:",
                  abi.encodePacked(IERC20(want).name(),"The Force Token"
                  )
            ));
      swap2YFIIRouting = [output,weth,yfii];//knownsec// for <> weth <> yfii
      swap2TokenRouting = [output,weth,want];//knownsec// for <> weth <> HBTC
      doApprove();
      strategyDev = tx.origin;
}

function doApprove () public{//knownsec// 授权 unirouter 额度
      IERC20(output).safeApprove(unirouter, 0);
      IERC20(output).safeApprove(unirouter, uint(-1));
}


function deposit() public {//knownsec// 流动性挖矿
      uint _want = IERC20(want).balanceOf(address(this));
      address _controller = For(fortube).controller();
      if (_want > 0) {
            // IERC20(want).safeApprove(_controller, 0);
            IERC20(want).safeApprove(_controller, _want);
            For(fortube).deposit(want,_want);
      }

}

// Controller only function for creating additional rewards from dust
function withdraw(IERC20 _asset) external returns (uint balance) {//knownsec// 提现某资产 for/weth
      require(msg.sender == controller, "!controller");//knownsec// 仅控制器调用
      require(want != address(_asset), "want");//knownsec// 校验不为 HBTC
      balance = _asset.balanceOf(address(this));
      _asset.safeTransfer(controller, balance);
}

// Withdraw partial funds, normally used with a vault withdrawal
function withdraw(uint _amount) external {
      require(msg.sender == controller, "!controller");
      uint _balance = IERC20(want).balanceOf(address(this));
      if (_balance < _amount) {
            _amount = _withdrawSome(_amount.sub(_balance));
            _amount = _amount.add(_balance);
      }

      uint _fee = 0;
      if (withdrawalFee>0){//knownsec// 若有提现费,收取 withdrawalFee/withdrawalMax
            _fee = _amount.mul(withdrawalFee).div(withdrawalMax);
            IERC20(want).safeTransfer(Controller(controller).rewards(), _fee);
      }


      address _vault = Controller(controller).vaults(address(want));
      require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
      IERC20(want).safeTransfer(_vault, _amount.sub(_fee));
}

// Withdraw all funds, normally used when migrating strategies
function withdrawAll() external returns (uint balance) {
      require(msg.sender == controller || msg.sender == governance,"!governance");
      _withdrawAll();


      balance = IERC20(want).balanceOf(address(this));

      address _vault = Controller(controller).vaults(address(want));
      require(_vault != address(0), "!vault"); // additional protection so we don't burn the funds
      IERC20(want).safeTransfer(_vault, balance);//knownsec// 本合约所有 HBTC 转给对应 vault
}

function _withdrawAll() internal {
      address _controller = For(fortube).controller();
      IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(want));
      uint b = fToken.balanceOf(address(this));
      For(fortube).withdraw(want,b);
}

function harvest() public {
      require(!Address.isContract(msg.sender),"!contract");
      ForReward(fortube_reward).claimReward();
```

```
            doswap();
            dosplit();//分 yfii
            deposit();
      }

      function doswap() internal {
            uint256 _2token = IERC20(output).balanceOf(address(this)).mul(90).div(100); //90%
            uint256 _2yfii = IERC20(output).balanceOf(address(this)).mul(10).div(100);   //10%
            UniswapRouter(unirouter).swapExactTokensForTokens(_2token, 0, swap2TokenRouting, address(this),
now.add(1800));
            UniswapRouter(unirouter).swapExactTokensForTokens(_2yfii, 0, swap2YFIIRouting, address(this),
now.add(1800));
      }
      function dosplit() internal{//knownsec// 分发 yfii
            uint b = IERC20(yfii).balanceOf(address(this));
            uint _fee = b.mul(fee).div(max);//knownsec// 本合约 YFII 量 * fee / max
            uint _callfee = b.mul(callfee).div(max);//knownsec// 本合约 YFII 量 * callfee / max
            uint _burnfee = b.mul(burnfee).div(max);//knownsec// 本合约 YFII 量 * burnfee / max
            IERC20(yfii).safeTransfer(Controller(controller).rewards(), _fee); //3%   3% team
            IERC20(yfii).safeTransfer(msg.sender, _callfee); //call fee 1%
            IERC20(yfii).safeTransfer(burnAddress, _burnfee); //burn fee 5%

            if (strategyfee >0){
                  uint _strategyfee = b.mul(strategyfee).div(max); //1%
                  IERC20(yfii).safeTransfer(strategyDev, _strategyfee);
            }
      }

      function _withdrawSome(uint256 _amount) internal returns (uint) {
            For(fortube).withdrawUnderlying(want,_amount);
            return _amount;
      }

      function balanceOfWant() public view returns (uint) {
            return IERC20(want).balanceOf(address(this));
      }

      function balanceOfPool() public view returns (uint) {
            address _controller = For(fortube).controller();
            IFToken fToken = IFToken(IBankController(_controller).getFTokeAddress(want));
            return fToken.calcBalanceOfUnderlying(address(this));
      }


      function balanceOf() public view returns (uint) {
            return balanceOfWant()
                        .add(balanceOfPool());
      }

      function setGovernance(address _governance) external {
            require(msg.sender == governance, "!governance");
            governance = _governance;
      }

      function setController(address _controller) external {
            require(msg.sender == governance, "!governance");
            controller = _controller;
      }
      function setFee(uint256 _fee) external{
            require(msg.sender == governance, "!governance");
            fee = _fee;
      }
      function setStrategyFee(uint256 _fee) external{
            require(msg.sender == governance, "!governance");
            strategyfee = _fee;
      }
      function setCallFee(uint256 _fee) external{
            require(msg.sender == governance, "!governance");
            callfee = _fee;
      }
      function setBurnFee(uint256 _fee) external{
            require(msg.sender == governance, "!governance");
            burnfee = _fee;
      }
      function setBurnAddress(address _burnAddress) public{
            require(msg.sender == governance, "!governance");
            burnAddress = _burnAddress;
      }

      function setWithdrawalFee(uint _withdrawalFee) external {
            require(msg.sender == governance, "!governance");
            require(_withdrawalFee <=100,"fee >= 1%"); //max:1%
            withdrawalFee = _withdrawalFee;
      }
}
```

iVaultHBTC.sol

```
/**
 *Submitted for verification at Etherscan.io on 2020-09-13
*/

/**
 *Submitted for verification at Etherscan.io on 2020-09-04
*/

/**
 *Submitted for verification at Etherscan.io on 2020-08-13
*/

pragma solidity ^0.5.16;//knownsec// 指定编译器版本

interface IERC20 {//knownsec// ERC20 代币标准接口
    function totalSupply() external view returns (uint256);
    function balanceOf(address account) external view returns (uint256);
    function transfer(address recipient, uint256 amount) external returns (bool);
    function allowance(address owner, address spender) external view returns (uint256);
    function approve(address spender, uint256 amount) external returns (bool);
    function transferFrom(address sender, address recipient, uint256 amount) external returns (bool);
    event Transfer(address indexed from, address indexed to, uint256 value);
    event Approval(address indexed owner, address indexed spender, uint256 value);
}

contract Context {//knownsec// 上下文属性
    constructor () internal { }
    // solhint-disable-previous-line no-empty-blocks

    function _msgSender() internal view returns (address payable) {
        return msg.sender;
    }

    function _msgData() internal view returns (bytes memory) {
        this; // silence state mutability warning without generating bytecode - see
https://github.com/ethereum/solidity/issues/2691
        return msg.data;
    }
}

contract Ownable is Context {//knownsec// 所有权合约,继承自 Context
    address private _owner;

    event OwnershipTransferred(address indexed previousOwner, address indexed newOwner);
    constructor () internal {
        _owner = _msgSender();
        emit OwnershipTransferred(address(0), _owner);
    }
    function owner() public view returns (address) {
        return _owner;
    }
    modifier onlyOwner() {
        require(isOwner(), "Ownable: caller is not the owner");
        _;
    }
    function isOwner() public view returns (bool) {
        return _msgSender() == _owner;
    }
    function renounceOwnership() public onlyOwner {
        emit OwnershipTransferred(_owner, address(0));
        _owner = address(0);
    }
    function transferOwnership(address newOwner) public onlyOwner {
        _transferOwnership(newOwner);
    }
    function _transferOwnership(address newOwner) internal {
        require(newOwner != address(0), "Ownable: new owner is the zero address");
        emit OwnershipTransferred(_owner, newOwner);
        _owner = newOwner;
    }
}

contract ERC20 is Context, IERC20 {//knownsec// ERC20 代币标准实现,继承自 Context、IERC20
    using SafeMath for uint256;

    mapping (address => uint256) private _balances;

    mapping (address => mapping (address => uint256)) private _allowances;

    uint256 private _totalSupply;
    function totalSupply() public view returns (uint256) {
        return _totalSupply;
    }
    function balanceOf(address account) public view returns (uint256) {
        return _balances[account];
    }
    function transfer(address recipient, uint256 amount) public returns (bool) {
        _transfer(_msgSender(), recipient, amount);
        return true;
    }
    function allowance(address owner, address spender) public view returns (uint256) {
        return _allowances[owner][spender];
    }
    function approve(address spender, uint256 amount) public returns (bool) {
        _approve(_msgSender(), spender, amount);
        return true;
    }
    function transferFrom(address sender, address recipient, uint256 amount) public returns (bool) {
        _transfer(sender, recipient, amount);
        _approve(sender, _msgSender(), _allowances[sender][_msgSender()].sub(amount, "ERC20: transfer
amount exceeds allowance"));
        return true;
    }
    function increaseAllowance(address spender, uint256 addedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
        return true;
    }
    function decreaseAllowance(address spender, uint256 subtractedValue) public returns (bool) {
        _approve(_msgSender(), spender, _allowances[_msgSender()][spender].sub(subtractedValue, "ERC20:
decreased allowance below zero"));
        return true;
    }
    function _transfer(address sender, address recipient, uint256 amount) internal {
        require(sender != address(0), "ERC20: transfer from the zero address");
        require(recipient != address(0), "ERC20: transfer to the zero address");

        _balances[sender] = _balances[sender].sub(amount, "ERC20: transfer amount exceeds balance");
        _balances[recipient] = _balances[recipient].add(amount);
        emit Transfer(sender, recipient, amount);
    }
    function _mint(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: mint to the zero address");

        _totalSupply = _totalSupply.add(amount);
        _balances[account] = _balances[account].add(amount);
        emit Transfer(address(0), account, amount);
    }
    function _burn(address account, uint256 amount) internal {
        require(account != address(0), "ERC20: burn from the zero address");

        _balances[account] = _balances[account].sub(amount, "ERC20: burn amount exceeds balance");
        _totalSupply = _totalSupply.sub(amount);
        emit Transfer(account, address(0), amount);
    }
    function _approve(address owner, address spender, uint256 amount) internal {
        require(owner != address(0), "ERC20: approve from the zero address");
        require(spender != address(0), "ERC20: approve to the zero address");

        _allowances[owner][spender] = amount;
        emit Approval(owner, spender, amount);
    }
    function _burnFrom(address account, uint256 amount) internal {
        _burn(account, amount);
        _approve(account, _msgSender(), _allowances[account][_msgSender()].sub(amount, "ERC20: burn
amount exceeds allowance"));
    }
}

contract ERC20Detailed is IERC20 {//knownsec// ERC20 代币补充信息,继承自 IERC20
    string private _name;
    string private _symbol;
    uint8 private _decimals;

    constructor (string memory name, string memory symbol, uint8 decimals) public {
        _name = name;
        _symbol = symbol;
        _decimals = decimals;
    }
    function name() public view returns (string memory) {
        return _name;
    }
    function symbol() public view returns (string memory) {
        return _symbol;
    }
    function decimals() public view returns (uint8) {
        return _decimals;
    }
}

library SafeMath {//knownsec// 安全算数库
    function add(uint256 a, uint256 b) internal pure returns (uint256) {
        uint256 c = a + b;
        require(c >= a, "SafeMath: addition overflow");

        return c;
    }
    function sub(uint256 a, uint256 b) internal pure returns (uint256) {
        return sub(a, b, "SafeMath: subtraction overflow");
    }
    function sub(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b <= a, errorMessage);
        uint256 c = a - b;

        return c;
    }
    function mul(uint256 a, uint256 b) internal pure returns (uint256) {
        if (a == 0) {
            return 0;
        }

        uint256 c = a * b;
        require(c / a == b, "SafeMath: multiplication overflow");

        return c;
    }
    function div(uint256 a, uint256 b) internal pure returns (uint256) {
        return div(a, b, "SafeMath: division by zero");
    }
    function div(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        // Solidity only automatically asserts when dividing by 0
        require(b > 0, errorMessage);
        uint256 c = a / b;

        return c;
    }
    function mod(uint256 a, uint256 b) internal pure returns (uint256) {
        return mod(a, b, "SafeMath: modulo by zero");
    }
    function mod(uint256 a, uint256 b, string memory errorMessage) internal pure returns (uint256) {
        require(b != 0, errorMessage);
        return a % b;
    }
}

library Address {//knownsec// OpenZeppelin Address 库
    function isContract(address account) internal view returns (bool) {
        bytes32 codehash;
        bytes32 accountHash = 0xc5d2460186f7233c927e7db2dcc703c0e500b653ca82273b7bfad8045d85a470;
        // solhint-disable-next-line no-inline-assembly
        assembly { codehash := extcodehash(account) }
        return (codehash != 0x0 && codehash != accountHash);
    }
    function toPayable(address account) internal pure returns (address payable) {
        return address(uint160(account));
    }
    function sendValue(address payable recipient, uint256 amount) internal {
        require(address(this).balance >= amount, "Address: insufficient balance");

        // solhint-disable-next-line avoid-call-value
        (bool success, ) = recipient.call.value(amount)("");
        require(success, "Address: unable to send value, recipient may have reverted");
    }
}

library SafeERC20 {//knownsec// OpenZeppelin SafeERC20 库
    using SafeMath for uint256;
    using Address for address;

    function safeTransfer(IERC20 token, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transfer.selector, to, value));
    }

    function safeTransferFrom(IERC20 token, address from, address to, uint256 value) internal {
        callOptionalReturn(token, abi.encodeWithSelector(token.transferFrom.selector, from, to, value));
    }

    function safeApprove(IERC20 token, address spender, uint256 value) internal {
        require((value == 0) || (token.allowance(address(this), spender) == 0),
            "SafeERC20: approve from non-zero to non-zero allowance"
        );
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, value));
    }

    function safeIncreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).add(value);
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }

    function safeDecreaseAllowance(IERC20 token, address spender, uint256 value) internal {
        uint256 newAllowance = token.allowance(address(this), spender).sub(value, "SafeERC20: decreased
allowance below zero");
        callOptionalReturn(token, abi.encodeWithSelector(token.approve.selector, spender, newAllowance));
    }
    function callOptionalReturn(IERC20 token, bytes memory data) private {
        require(address(token).isContract(), "SafeERC20: call to non-contract");

        // solhint-disable-next-line avoid-low-level-calls
        (bool success, bytes memory returndata) = address(token).call(data);
        require(success, "SafeERC20: low-level call failed");

        if (returndata.length > 0) { // Return data is optional
            // solhint-disable-next-line max-line-length
            require(abi.decode(returndata, (bool)), "SafeERC20: ERC20 operation did not succeed");
        }
    }
}

interface Controller {
    function withdraw(address, uint) external;
    function balanceOf(address) external view returns (uint);
    function earn(address, uint) external;
}

contract iVault is ERC20, ERC20Detailed {//knownsec// iVualt 合约,继承自 ERC20、ERC20Detailed
    using SafeERC20 for IERC20;
    using Address for address;
    using SafeMath for uint256;

    IERC20 public token;

    uint public min = 9500;
    uint public constant max = 10000;
    uint public earnLowerlimit; //池内空余资金到这个值就自动 earn

    address public governance;
    address public controller;

    constructor (address _token,uint _earnLowerlimit) public ERC20Detailed(
        string(abi.encodePacked("yfii ", ERC20Detailed(_token).name())),
        string(abi.encodePacked("i", ERC20Detailed(_token).symbol())),//knownsec// iHBTC
        ERC20Detailed(_token).decimals()
    ) {
        token = IERC20(_token);
        governance = tx.origin;
        controller = 0xcDCf1f9Ac816Fed665B09a00f60c885dd8848b02;
        earnLowerlimit = _earnLowerlimit;
    }

    function balance() public view returns (uint) {//knownsec// 本合约 HBTC 量 + 控制器 iHBTC 量
        return token.balanceOf(address(this))
                .add(Controller(controller).balanceOf(address(token)));
    }

    function setMin(uint _min) external {
        require(msg.sender == governance, "!governance");
        min = _min;
    }

    function setGovernance(address _governance) public {
        require(msg.sender == governance, "!governance");
        governance = _governance;
    }

    function setController(address _controller) public {
        require(msg.sender == governance, "!governance");
        controller = _controller;
    }
    function setEarnLowerlimit(uint256 _earnLowerlimit) public{
      require(msg.sender == governance, "!governance");
      earnLowerlimit = _earnLowerlimit;
  }

    // Custom logic in here for how much the vault allows to be borrowed
    // Sets minimum required on-hand to keep small withdrawals cheap
    function available() public view returns (uint) {//knownsec// 可用量
        return token.balanceOf(address(this)).mul(min).div(max);
    }

    function earn() public {//knownsec// 赚取利息
        uint _bal = available();
        token.safeTransfer(controller, _bal);
        Controller(controller).earn(address(token), _bal);
    }

    function depositAll() external {//knownsec// 存入调用者所有 HBTC
        deposit(token.balanceOf(msg.sender));
    }

    function deposit(uint _amount) public {//knownsec// 存入 HBTC
        uint _pool = balance();
        uint _before = token.balanceOf(address(this));
        token.safeTransferFrom(msg.sender, address(this), _amount);
        uint _after = token.balanceOf(address(this));
        _amount = _after.sub(_before); // Additional check for deflationary tokens
        uint shares = 0;
        if (totalSupply() == 0) {
            shares = _amount;
        } else {
            shares = (_amount.mul(totalSupply())).div(_pool);
        }
        _mint(msg.sender, shares);
        if (token.balanceOf(address(this))>earnLowerlimit){
          earn();
        }
    }

    function withdrawAll() external {//knownsec// 提现所有 iHBTC 为 HBTC
        withdraw(balanceOf(msg.sender));
    }



    // No rebalance implementation for lower fees and faster swaps
    function withdraw(uint _shares) public {//knownsec// iHBTC 提现为 HBTC
        uint r = (balance().mul(_shares)).div(totalSupply());
        _burn(msg.sender, _shares);

        // Check balance
        uint b = token.balanceOf(address(this));
        if (b < r) {
            uint _withdraw = r.sub(b);
            Controller(controller).withdraw(address(token), _withdraw);
            uint _after = token.balanceOf(address(this));
            uint _diff = _after.sub(b);
            if (_diff < _withdraw) {
                r = b.add(_diff);
            }
        }

        token.safeTransfer(msg.sender, r);
    }

    function getPricePerFullShare() public view returns (uint) {//knownsec// HBTC/iHBTC 汇率
        return balance().mul(1e18).div(totalSupply());
    }
}
```

5. Appendix B: Vulnerability risk rating criteria

Smart contract vulnerability rating criteria

Vulnerability rating	Vulnerability rating description
High-risk vulnerabilities	Vulnerabilities that can directly cause losses of token contracts or users' funds, such as: numerical overflow loopholes that can cause the value of token to return to zero, false charging loopholes that can cause losses of tokens in exchanges, or ETH or re-entry loopholes in contract accounts; Vulnerabilities that can cause the loss of escrow rights of token contracts, such as access control defects of key functions, access control byPass of key functions caused by call injection, etc. Vulnerabilities that cause token contracts to not work properly, such as the denial of service vulnerability caused by sending the ETH to a malicious address, or the denial of service vulnerability caused by running out of gas.
Medium-Dangerous Vulnerability	High-risk vulnerabilities that require a specific address to trigger, such as numerical overflow vulnerabilities that can only be triggered by the owner of a token contract; Access control defects of non-critical functions, logical design defects that cannot cause direct capital loss, etc.
Low-risk vulnerabilities	Vulnerabilities that are difficult to be triggered, vulnerabilities that have limited harm after being triggered, such as numerical overflow vulnerabilities that require a large number of ETH or tokens to be triggered, vulnerabilities that the attacker cannot directly profit after triggering numerical overflow, and transaction sequence dependence risks triggered by specifying high gas, etc.

6. Appendix C: Introduction to vulnerability testing tools

6.1 Manticore

A Manticore is a symbolic execution tool for analyzing binary files and smart contracts. A Manticore consists of a symbolic Ethereum virtual machine (EVM), an EVM disassembler/assembler, and a convenient interface for automatic compilation and analysis of the Solarium body.It also incorporates Ethersplay, a Bit of Traits of Bits visual disassembler for EVM bytecode, for visual analysis. Like binaries, Manticore provides a simple command-line interface and a Python API for analyzing EVM bytecode.

6.2 Oyente

Oyente is a smart contract analysis tool that can be used to detect common bugs in smart contracts, such as reentrancy, transaction ordering dependencies, and so on.More conveniently, Oyente's design is modular, so this allows power users to implement and insert their own inspection logic to check the custom properties in their contracts.

6.3 securify. Sh

Securify verifies the security issues common to Ethereum's smart contracts, such as unpredictability of trades and lack of input verification, while fully automated and analyzing all possible execution paths, and Securify has a specific language for identifying vulnerabilities that enables the securities to focus on current security and other reliability issues at all times.

6.4 Echidna

Echidna is a Haskell library designed for fuzzy testing EVM code.

6.5 MAIAN

MAIAN is an automated tool used to find holes in Ethereum's smart contracts. MAIAN processes the bytecode of the contract and tries to set up a series of transactions to find and confirm errors.

6.6 ethersplay

Ethersplay is an EVM disassembler that includes correlation analysis tools.

6.7 IDA - evm entry

Ida-evm is an IDA processor module for the Ethereum Virtual Machine (EVM).

6.8 want - ide

Remix is a browser-based compiler and IDE that allows users to build ethereum contracts and debug transactions using Solarium language.

6.9 KnownSec Penetration Tester kit

KnownSec penetration tester's toolkit, developed, collected and used by KnownSec penetration tester engineers, contains batch automated testing tools, self-developed tools, scripts or utilization tools, etc. dedicated to testers.